FEBRUARY 1990
VOLUME THREE NUMBER FIVE
SEVEN DOLLARS

CIO

THE MAGAZINE FOR INFORMATION EXECUTIVES

GETTING A MOVE ON WITH TECHNOLOGY

TURNING THE TIDE IN MIAMI BEACH

AN IDG COMMUNICATIONS PUBLICATION

The Bekins Company's Larry Marzullo

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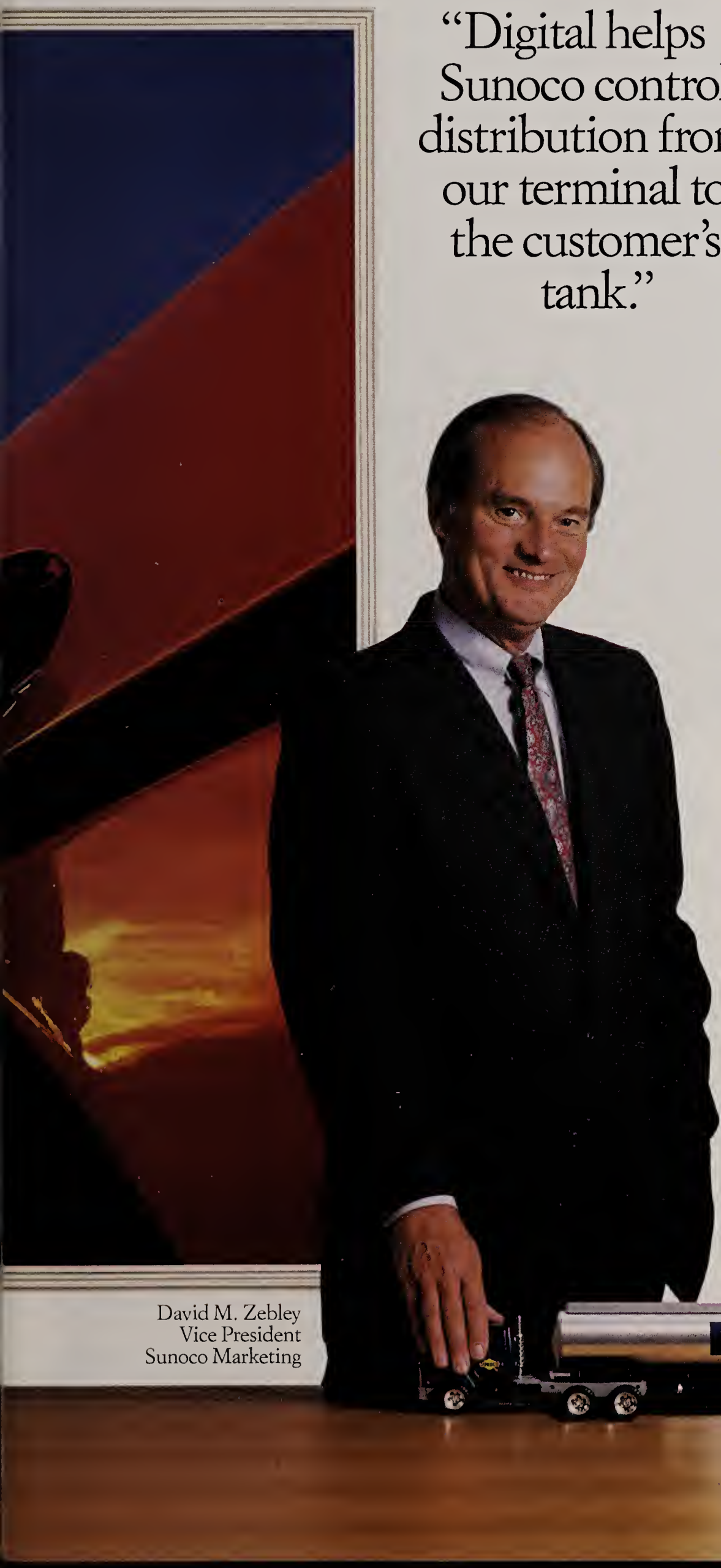

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CIO

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MOTOROLA

Travelers on major highways are often intimidated by the speeds at which truck drivers propel their behemoth-sized rigs, but the raw horsepower of these 18-wheelers is nothing compared to the power of the information systems that track the comings and goings of freight.

In the same way deregulation impacted airlines and banks, it has forced the transportation industry to redefine its business. As a result, freight carriers no longer just haul cargo. They provide inventory management, distribution services and warehousing for customers who demand service, service, service in addition to horsepower.

PHOTO BY RUSSELL WINDMAN

In our cover story this month ("Trucks, Ships, Planes, Trains and Brains," Page 36), Staff Writer Meghan O'Leary presents a panorama of the competitive environment of the transportation industry and explores how information technology has been instrumental in allowing freight carriers to transform their businesses in accordance with customer demands. Customers practicing just-in-time inventory and manufacturing are requiring split-second timing from freight carriers to deliver parts or raw materials to factories and products to retail outlets.

Consequently, carriers have developed information systems that elevate logistics to an art form. These systems use technologies such as cellular telephones, microwave transponders and barcoding. With its TIME-lok system, The Bekins Company not only tracks services at its 40 locations, but also is able to promise customers a money-back guarantee on delivery services.

IT also is helping companies to diversify and expand their client bases by offering a variety of transport modes to customers. Sea-Land Service Inc. is testing a system that uses microwave transponders to send information about the weight and temperature of cargo containers to headquarters. With this system, Sea-Land hopes to attract new customers whose shipments are time- or temperature-sensitive.

But logistics is only one part of the formula for success in the transportation industry. Providing information to customers about the status of their shipments and making it easy for them to communicate with carriers are as important as the physical movement of goods. Summit Information Systems, the wholly-owned subsidiary of Roadway Express Inc., offers its customers PC-based software for tracking shipments, electronic invoicing and printing of bills of lading. And these are far from being mere frills. As one executive put it, "We need to have these services just to play the game."

With a solid IT infrastructure that facilitates communication, the transportation industry has been able to quickly react to market conditions with new products. And it has forged alliances with customers the likes of which make IT visionaries very, very happy.

Marcia Blumenthal

CIO

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BPA

CIO

February 1990

"There are two types of CIOs today: those who *make* history and those who *are* history."

Dear Executive:

Will your organization be a leader in the 1990s? For most information executives, this is the key question of the decade. We stand at the dawn of a new age -- the age of global expansion. This is a time of tremendous opportunity as organizations position for entry into worldwide markets; it promises enormous rewards to the successful. Who will be successful in this highly competitive environment? Organizations that quickly respond to the changing needs of these markets while efficiently controlling their own global operations. Developing sound competitive business strategies in the global arena will be critical.

What will be the key issues confronting CIOs as we move into the 1990s? According to a recent study of our readers, the two primary concerns involve a) using IS for a competitive advantage and b) aligning IS and corporate goals. These concerns are motivated by the overriding pressure for you to design efficient information systems to ensure that your organizations will be winners in the 1990s.

CIO Magazine and AMR International are teaming up to present their second CIO EXECUTIVE FORUM to help you explore the real business issues for the '90s. For detailed information on our upcoming conference, "Computer & Communications Strategies & Global Competition," to be held May 20-22 in Dallas, Texas, please call Lori Cardarelli (508) 935-4631, or Diane Martin (508) 935-4274. They'll rush you complete information plus a registration package via return mail.

Remember, it's better to make history than be history.

Sincerely,

Joseph L. Levy
President and Publisher

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Coming in CIO

Disaster Relief

The October earthquake in San Francisco showed the value of having a disaster-recovery plan in place—even when the data center is far from the epicenter. *CIO* examines disaster-recovery options and strategies.

Beyond User Friendliness

The user-computer relationship amounts to more than just a pretty interface. Instead of an add-on afterthought, the relationship has to be built into system design from the start. *CIO* looks at the friendlier future.

Imaging

Many companies are making progress in the struggle to combat the tenacious stranglehold of paper on the workplace. *CIO* chronicles the efforts of some of the combatants.

Outsourcing

Although we stop short of calling it the rage, letting third parties take on the burden—and worry—of a variety of information-processing chores is clearly an idea that is spreading. *CIO* looks at whether outsourcing is a blessing or merely a contagion.

mation is being gathered to make post-merger decisions.

Prior to an acquisition, fewer than half of acquiring companies have full information on computer hardware systems, and less than one-third have full information on software or voice and data communications systems. In over one-third of mergers and acquisitions, there is inadequate information shared between acquired and acquiring companies upon which to base major decisions concerning information systems. Half the time no one thinks to ask for the information, and 30 percent of acquired IS organizations cannot provide the information that *is* requested.

In nearly two-thirds of all mergers and acquisitions, one or more system incompatibilities must be resolved, according to the AMA study. These are frequently not detected until after the merger or acquisition has taken place. As a result, in a quarter of all mergers and acquisitions it often takes a year or more to consolidate the combining companies' systems. And the longer it takes to form the new IS organization, set priorities for consolidating systems, and implement those priorities, the greater the probability that such problems as lower employee productivity, reduced profitability and a high employee turnover rate will occur during the first 12 months.

Corporate executives as well as consulting firms that specialize in mergers and acquisitions tend to minimize the effort required to merge information systems and the organizations that support them. Why? There appears to be a general lack of appreciation for the impact of information systems on the outcome of mergers and acquisitions, and few people who specialize in M&A activities have as deep an understanding of information systems and technology as they do of finance, accounting, law and corporate administration. As an example, one of the most popular due-diligence M&A checklists is nearly 100 pages long, yet it fails to contain any direct reference to gathering pre-merger data related to IS.

As with other IS planning activities—such as disaster recovery or technical architecture—the commitment to preparing information systems for the eventuality of a merger or acquisition must come from the highest level in an organization. But the actual preparation is the responsibility of IS management.

Even without a mandate from the CEO, president or board of directors, there are things that IS management can do to plan for a change in ownership. A well-documented and effective systems architecture provides a solid foundation for exchanging information concerning hardware, software, development tools, communications, end-user computing, development standards, and information systems procedures. At a minimum, an information systems organization can improve its preparedness for a merger or acquisition by developing and maintaining the following:

The longer it takes to form a new IS organization, the greater the probability that lower employee productivity, reduced profitability and a high employee turnover rate will occur during the first 12 months.

- a functional organization description that includes the mission of the IS organization, the purpose and responsibilities of each component down to the first line managers, and the level of staffing by component and function;
- a systems manual that contains a description of each application system in terms of its purpose, basic processing requirements, input and output (including samples of the most commonly used screens and reports), and source of license, development and/or maintenance;
- a file of vendor licensing, purchasing, leasing, and maintenance agreements;
- an inventory of hardware, software and communications facilities in use;
- a set of clearly documented information systems standards and procedures.

Because of individual business and technical requirements, system incompatibilities between any two companies cannot always be avoided. However, IS management can take steps to minimize the effort required to consolidate systems—if necessary—after a merger or acquisition.

First, unless business requirements dictate otherwise, packaged software should be used for systems such as finance, accounting, administration and human resources. Second, customization of vendor-supplied software should be kept to a minimum as dictated by business needs, with changes isolated to a few source modules and documented clearly in the systems manual. Third, vendor agreements for hardware, software, communications and maintenance should be negotiated to include a transfer of rights and responsibilities following a merger.

In the face of leaner IS budgets and the prospect of more exciting projects involving advanced technologies such as EDI and image processing, preparing information systems for the eventuality of a merger or acquisition may seem like a very low-priority activity. But the typical company today is much more likely to be involved in a merger or acquisition than to be crippled by a data-center disaster. Achieving the level of preparedness suggested here will not only ease the effort and cost of a post-merger transition, but will help improve the effectiveness of the current day-to-day management of the IS organization. CIO

Norbert J. Kubilus is vice president for management services at Optimal Solutions Inc., of Hoboken, N.J., a consulting firm that specializes in helping corporations manage change in their IS organizations.

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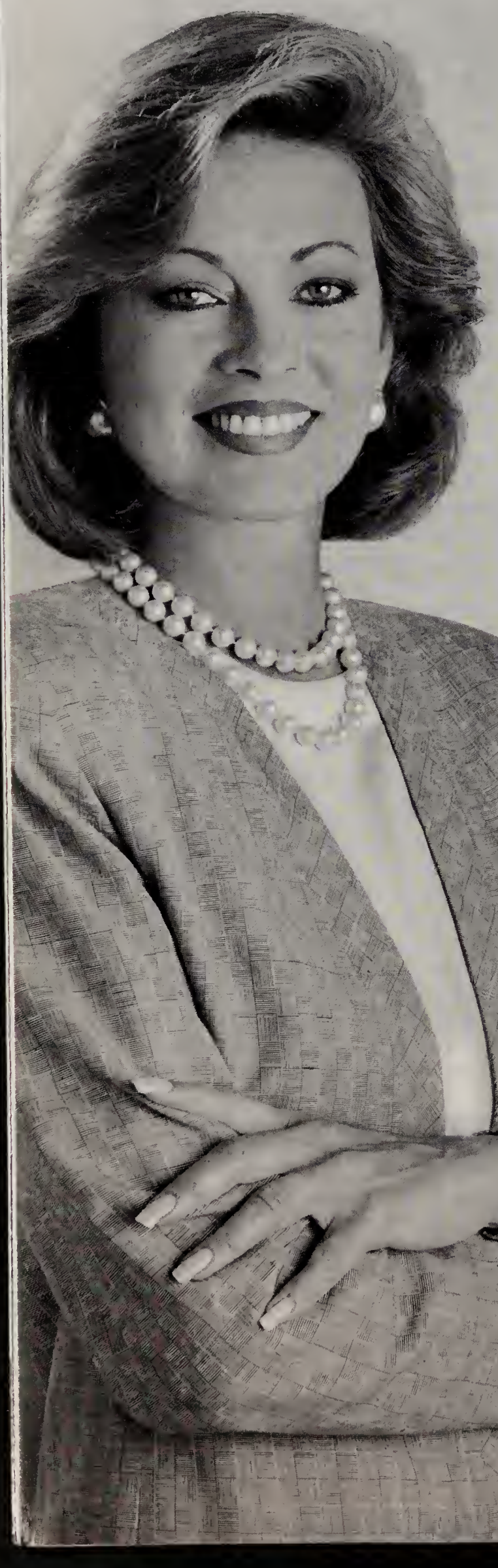

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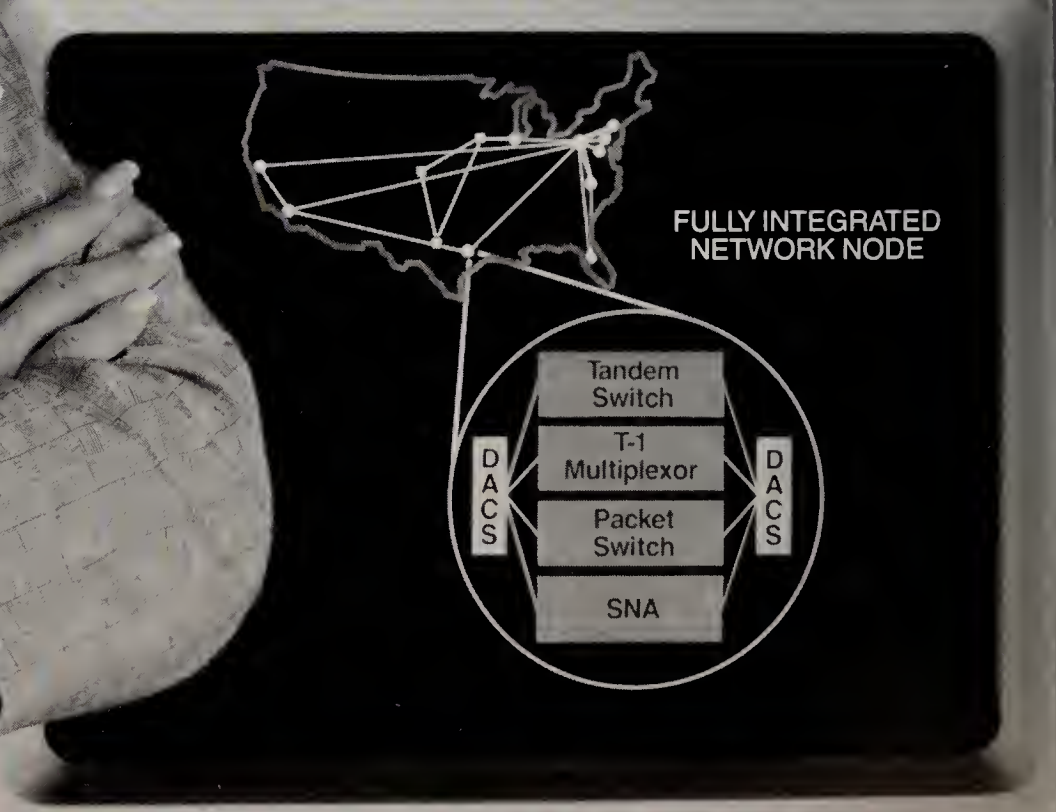

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TRENDLINES

SALES SUPPORT

NEW TOOLS FOR THE TOOLMAKERS

Whether justified or not, the computer industry has had a reputation, like the shoemaker's barefoot children, for making ingenious stuff that it scarcely bothers to use in its own operations. The logic is that these companies are so busy marketing so-called strategic solutions that they haven't implemented many of their own.

But a report last fall from Arthur D. Little Inc., the Cambridge, Mass.-based research and consulting firm, indicates that competitive pressures are leading many hardware vendors to use IT to streamline their sales operations.

If computer companies have lagged generally in using IT, the sales function—as in most organizations—has lagged specifically. This has been particularly disadvantageous in the computer industry, according to the ADL report, because of the products' great complexity and frequent modification. In addition, the report said, since customer requirements often involve assembling components from different categories, salespeople need a mastery of broad product lines.

The trick is giving salespeople systems that provide just enough information to be effective without overwhelming them with superfluous detail. Among the computer companies cited by ADL for providing strong sales-support systems are some of the usual suspects: Digital Equipment Corp., Hewlett-Packard, IBM, Prime and Wang.

According to the report, DEC, for example, has a system called ACCESS that, in addition to providing product and pricing information that is updated daily, offers salespeople "success stories" that describe the achievements of their peers in selling particular products for particular applications. Digital also has tools to aid in properly configuring systems so that installation goes smoothly, software compatibility and licensing requirements are seen to and all necessary components are included.

Hewlett-Packard, which exhaustively studied its sales force prior to implementing sales systems, had the clear goal of improving productivity. Salespeople now use laptop PCs to access sales-support databases and communicate internally via E-mail. According to the ADL report, HP—in addition to high measurable improvements in sales productivity—has reaped such "intangible" benefits as greater customer satisfaction with sales reps' responsiveness and follow-up work. The laptops also are an active evidentiary tool. "Instead of talking about the benefits of office automation," the report observes, "HP reps are demonstrating the benefits as end users."

The ADL report was prepared by the firm's Decision Resources division and authored by Clifford A. Bean, a senior consultant in the Management Consulting Section, and S. Russel Craig, an ADL vice president and director of the Technical Business Counseling Group. ■

LONGEVITY ENHANCEMENT

A recent Deloitte & Touche survey found that nearly 30 percent of all CIOs are dismissed or demoted. At a Society for Information Management (SIM) meeting in Boston late last fall, Robert G. Gilbertson, CEO of Data Switch Corp. of Shelton, Conn., and president-elect of the American Electronics Association, offered some advice to CIOs who don't want to become a statistic.

The four keys to CIO job survival in the 1990s, he said, were clearly defining IS and end-user responsibilities, establishing standards, centralized management of networks and databases, and providing IT services that maximize corporate and departmental strategies. CIOs who want to turn this from theory into practice must introduce accountability into the mix. "Without accountability, you won't know if you succeed," Gilbertson said.

He suggested that MIS and users agree upon a charter of responsibilities, which sets reporting procedures, cost guidelines and controls. He proposed IT review boards of end-user "application managers," and councils of departmental managers to review IS activity and give users a voice in IS decision-making. And he urged penalties or chargebacks for users who break agreed-upon standards and put systems and data at risk. ■

VIDEO DISPLAYS

The consultants at the Cambridge, Mass.-based Index Group think that companies with networks of computers need ". . . organizational structures that are appropriate to the moment."

So, they've produced a 30-minute videotape, called "The Networked Company," which includes comments from Index Group experts and executives at U.S. and European companies. The theme of the electronic presentation: "The time to act is now." Adapt your organization to your network before it's too late.

The tape sells for $150 and is available from the Index Group by calling Eileen Brockhurst, 617 492-1500, ext. 426.

In another video venture, a California firm is distributing a videotape that offers guidance in setting up ergonomically sound VDT workstations that minimize the incidence of musculoskeletal disorders associated with VDT use.

The 15-minute video—"Avoiding Computer Strains & Pains"—addresses the human-factors adjustments that should be made to safeguard employee health and safety. The tape also comes with a booklet that illustrates exercises employees can perform to alleviate muscle cramps and strains.

The U.S. Bureau of Labor Statistics estimates that computer-related injuries and illnesses are the fastest-growing afflictions among the 42 million VDT users.

The tape is available from Advantage Media Inc., of Chatsworth, Calif., 818-700-0504. ■

ILLUSTRATION BY BETHANY GULLY

TRENDLINES

INFOPRENEURS

EVENTS UNLIMITED

Kathleen Murphy has a vision of human events unfolding in an orderly way, unclouded by conflict. Her definition of organizational calamity might be for a wood-products trade association to discover that its annual conference on moldings and wainscoting, to be held in Buffalo, falls on the same two days in May as the International Interior/Exterior Plywood Expo scheduled for Boise.

Bummer.

But Murphy has compiled her vision into a database that she hopes will help corporate events planners avoid scheduling conflicts and maximize the significant dollar investment in events by both hosts and attendees. Murphy is president and founder of the National Event Clearinghouse Inc., of Vienna, Va. The centerpiece of Murphy's business is a "national computerized calendar" that ambitiously aspires to log "all activities being held in the United States."

Murphy, who works as an events-planning consultant on the side, started her database "because of the kinds of problems I was running into planning events." For example, she once was hired to do fund-raising for an anti-apartheid dinner scheduled to be held in Washington, as she came to discover, on the same night as a $5,000-a-plate Democratic Party gala. As a result, the natural target audience, which overlapped, was tapped out. "We were going after the exact same money," said Murphy.

Bummer.

At present, organizational subscribers to the NECH database service ($250 a year membership fee plus a $10 charge for each database sort) call in query requests in an effort to unearth scheduling conflicts, find likely event sponsors, plan attendance or simply learn as much as possible about events in a given industry or field of endeavor. Murphy, who counts a number of ad agencies and public-relations firms among her NECH subscribers, reports that one ad agency won an important race-track account by demonstrating to the prospective client an encyclopedic knowledge—acquired from NECH—of future scheduled equestrian events.

Attaining the goals of comprehensiveness and timeliness requires daily updating. Thus Murphy is on the mailing lists of some 10,000 event-holding organizations. As word of the existence of the database spreads, Murphy expects she will no longer need to aggressively solicit events information—it will simply roll in like the tide.

She believes that NECH will fulfill its order-out-of-chaos destiny only when access to the data is easy and flexible. Consequently, she is now looking energetically for venture capital backing to bring her database online. "People have all kinds of different reasons for needing the information," she said, "and they've got to be able to search it themselves."

In the meantime, the database keeps growing. ■

ILLUSTRATION BY BETHANY GULLY

ON THE RECORD

CIO July 1989 coverperson T. J. Rodgers, president of Cypress Semiconductor, unburdened himself of some thoughts on competitiveness for the *New York Times* op-ed page last month. Writing under the headline, "Managing Our Way to Decline," Rodgers contended that the business pundits have got it all wrong in taking "ordinary management failure" as the effect rather than the cause of increasing U.S. disadvantage in the global marketplace.

Rodgers used the example of the sale of Perkin-Elmer, once a leading maker of semiconductor manufacturing equipment, to Japanese-owned Nikon. Perkin-Elmer, he argued, made bad decisions that left it "without a competitive next-generation product." Having grown "large and complacent" and out of touch with the entrepreneurial spirit of innovation, PE tried to extend the market life of its outdated products, wrote Rodgers, and ended up losing customers instead.

Rodgers, whose company was portrayed in *CIO* as intensively self-scrutinizing in its IT-reliant management systems, blamed managerial complacency for squandering the advantages U.S. business has won through innovative genius. Rather than prop up at any cost weak businesses "deemed crucial to U.S. competitiveness," Rodgers advised nurturing a climate favorable to strong, innovative competitors while letting the losers die off, and thus "improve the species." ■

FEEDBACK

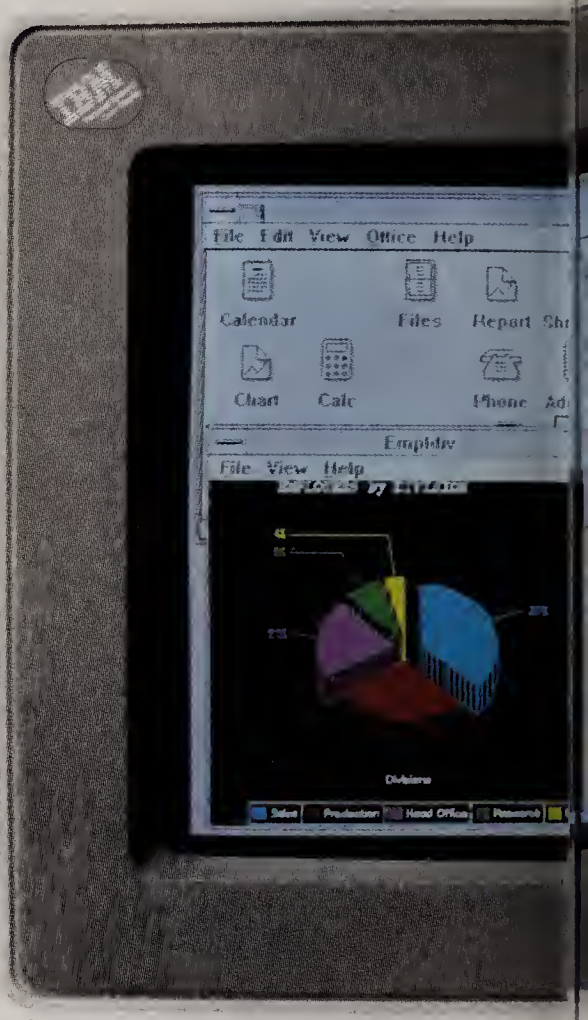
A new survey seems to suggest that sitting still can be hazardous to an executive's health—at least organizationally—leading to boredom, burnout and lower productivity.

The survey, conducted by Robert Half International, a San Francisco-based personnel recruiting firm, predicts that almost one-third of executives who stay in the same position for five years will experience a "decline in energy, creativity and performance." Another 13 percent will have similar feelings after six to 10 years.

Max Messmer, chairman of Robert Half, suggested that the findings show a need for executives to revitalize their jobs by taking on new responsibilities or making lateral moves. "The path to the top may well be sideways," said Messmer. ■

Introducing IB

*On a LAN.**



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For example, in the middle of an OfficeVision screen, you'll be able to "snap in" PC applications

*Displays shown here are IBM PS/2s running OS/2 EE.

M OfficeVision.

On a mainframe.

re's almost no difference.

like Lotus 1-2-3® or Microsoft Excel® while, at the same time, you can run larger business applications on host computers.

What's more, programs written for Presentation Manager™ can be loaded into their own OfficeVision windows. Which means not only can you see several such programs at once, you can often swap information between them. (See box.)

And thanks to OfficeVision's SAA interface, technicalities that often mystify users (like communications, multitasking and cooperative processing) become simple.

Also, OfficeVision has been designed to work with your previous investments. It will accommodate DOS workstations and nonprogrammable terminals, and you can install it on an as-needed basis.

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TRENDLINES

LITIGATION

A Level Runway

...not...guilty...

When could it be considered illegal to use IT for competitive advantage? Instead of shedding light on this legal question, the outcome of a recent court case has made it even murkier.

In December, a U.S. district court jury in Los Angeles found American Airlines and United Airlines "not guilty" of monopolizing the computerized airline reservations industry. In the lawsuit, filed in 1984 by competing carriers, American and United were alleged to have violated antitrust law by charging other airlines exorbitant fees to be listed on their respective Sabre and Apollo reservation systems. The suit contended these fees were injurious to competition. American and United were also charged with rigging their reservation systems so that information on competing airlines was not presented on an equal footing.

But while the jury cleared American and United of antitrust charges, Judge Edward Rafeedie appeared to have opened the door to others, according to a *New York Times* article on the verdict. The judge ruled during trial that evidence on American and United's fees could not be allowed in court because it related to fraud and racketeering laws rather than to antitrust laws, wrote *Times* reporter Michael Lev, citing Maxwell Blecher, an attorney representing plaintiffs Northwest, Alaska and Midway airlines.

Just what does the outcome of the CRS case mean?

"It means CIOs ought to talk to their legal departments," Harvard Business School Professor F. Warren McFarlan told *CIO* in the wake of the verdict. In an earlier *CIO* article ("Professor of Change," August 1988), McFarlan said that this case represented the beginning of a trend—the notion of "control of information as an abusive and predatory act."

But the airline verdict, although obviously agreeable to United and American, has not settled the question, according to McFarlan. "The real business issue wasn't addressed—whether there are unacceptable implications for competition in the way these airlines control the channels of distribution. Those issues are alive and well. They were probably brought up under the wrong statute."

Jim McKenney, a colleague of McFarlan's at Harvard and a member of the board of directors of Continental Airlines, agreed. The plaintiffs, he said, built their case "on a very narrow legal base"—that American and United were monopolizing the industry by charging fees. "The jury couldn't see why [American and United] couldn't charge something," said McKenney. "I think that was a pretty fine line to draw the battle on."

Attorney Blecher told the *Times* that his clients are considering further action, possibly based on the judge's "fraud and racketeering" ruling. For the time being, however, the case that will begin to define the legal limits of competitive advantage—wherever they may lie—has yet to be heard.

CAREER MOVES

Richard Rydell was recently named senior vice president and chief information officer of Memorial Health Services, a three-hospital system based in Long Beach, Calif. Previously, Rydell had been VP and CIO at Baystate Health Systems of Springfield, Mass. He is president-elect of the Healthcare Information and Management Systems Society of the American Hospital Association.

Former Texas Instruments CIO John W. White was named president of a new TI business unit that will focus on creating and marketing advanced information and automation systems. White, a 29-year veteran of TI, is succeeded at the helm of the IS group by Ralph J. Szygenda.

LET A SMILE BE YOUR UMBRELLA . . .

But don't expect to parlay it into a raise. Or so goes the wisdom contained in a recent survey by Accountemps, the nationwide accounting, bookkeeping and IS temporary-personnel service.

According to the survey of vice presidents and personnel directors at Fortune 1000 companies, employee performance evaluations are based largely on deeds rather than on a charming personality or the esteem in which one is held by fellow workers. Sixty-six percent of respondents cited "specific accomplishments" as the chief criterion they considered in reviewing employees' work, while 47 percent gave the greatest weight to "general work habits and performance" (percentages include multiple responses from some who rated both factors equally).

ILLUSTRATION BY MERLE NACHT

Personality and the comments of co-workers each earned a trivial one percent as keys to evaluation.

According to Accountemps (and Robert Half) Chairman Max Messmer, the survey results suggest that it might be a good idea for employees to keep "an ongoing file of tangible contributions to the company" that they can refer to when review time rolls around.

Another surprising result of the survey was the low score given seniority, once a major factor in employee evaluation; "length of time with company" garnered a measly four percent.

So, if you've got a scintillating personality but have been around for just years without going anyplace, maybe all your eggs have been in the wrong basket. Stop telling those terrific jokes and start making lists of everything you do.

Now what?

Even the best managed companies may find themselves in this seemingly untenable position. With market forces changing so rapidly, the same practices that built a business may now be blocking its path to the future.

Andersen Consulting can show you the way out.

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Where we go from here.℠

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Moving to the Line

For one former-IS chief, joining general management has been a learning, unlearning and teaching experience

BY R. TERRY HAAS

Until 1984 I had spent my entire professional career in IS—first in the U.S. Navy for six years, and then at Air Products and Chemicals Inc. for nine more. But nearly six years ago, I seized an opportunity at Air Products outside the IS function that has not only enabled me to use my systems background in a new way, but has expanded my abilities as a business manager. I moved from group systems manager for the company's Chemicals Group—responsible for managing a $6 million IS activity—to become manager of customer service and inside sales for Chemicals.

This move to line management has had its ups and downs. But after some initial learning and change, it has been an excellent experience for me and, I believe, has benefited the company.

When the vice president of the Chemicals Group asked me if I would take over the customer service and inside sales operation, I was initially surprised, and then concerned. Historically, this job had been held by people from chemical sales, not IS. So why did he want me?

First, some context. Air Products, headquartered in Allentown, Pa., is a $2.6 billion industrial gas and chemical company, with an expanding environmental/energy-systems business, that ranks 176th on the Fortune 500. The Chemicals Group accounts for nearly a billion dollars in annual sales. At the time of my promotion, the Chemicals Group's business was shifting from commodity to specialty chemicals. As the business changed, order activity would grow very quickly, changing in nature as well as in volume.

Instead of ordering in tanker-car-sized batches, customers would be ordering quantities as small as five gallons. In addition, since many customers had implemented just-in-time manufacturing, we would be subject to shorter lead times—in some cases less than 48 hours. We faced the added challenge of more demanding delivery requirements. For instance, some customers wanted materials shipped in color-coded drums and in pre-measured volumes dictated by their manufacturing processes.

These increased customer requirements meant that the customer-service function would also need to grow. But to be successful, customer service—consisting of order entry, shipment processing, pricing, invoicing, claims and inventory control—had to be aggressively managed.

Likewise, inside sales was supposed to efficiently manage the sales effort for many smaller accounts. Again, the sales effort had to be managed from initial inquiry through the sales prospect's sampling of a product and our follow-up work to convert the prospect into a buying customer.

All of this added up to more intensive, more complex "process" problems that needed to be solved. Top

ILLUSTRATION BY ROBERT NEUBECKER

Just three years ago, Compaq fired the shot heard around the world.

Now for the

In September 1986, Compaq introduced a personal computer that changed people's ideas about what a PC could do.

The COMPAQ DESKPRO 386 Personal Computer was the first PC based on the powerful 386 microprocessor. It gave people the speed and power to do more than ever before. It pushed out the envelope of technology. But did it in a way that let users continue to work with industry-standard software and hardware. With it, Compaq set a new standard in PC performance.

Compaq has done it again.

Introducing the COMPAQ DESKPRO 486/25 Personal Computer and COMPAQ SYSTEMPRO Personal Computer System.

Once again, Compaq has expanded the role of the PC—to meet the most demanding needs of both single and multiple users. And once again, Compaq has pushed out the envelope of technology to deliver new levels of performance and expandability, without sacrificing compatibility.

sonic boom.

These new computers were designed from a simple observation: People use computers differently. One user using a PC has different needs than a group working together on a network or multiuser system.

The COMPAQ DESKPRO 486/25 is for the individual whose job depends on a personal computer. It was designed from the ground up to unleash the power of the evolutionary new Intel 25-MHz 486 microprocessor.

The COMPAQ SYSTEMPRO delivers an unprecedented combination of system performance and expandability to networks and multiuser systems. Its breakthrough design gives users the flexibility to work with both 33-MHz 386 and future 33-MHz 486 technology. It also provides the unmatched capability to work with multiple processors.

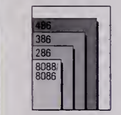
Inside both you'll find advances like cache memory designs that boost processor performance. Extended Industry Standard Architecture *(Extended ISA* or *EISA)* that accelerates input/output performance while maintaining compatibility. New drive and controller technology that increases fixed disk performance and reliability. And that's just the beginning of this story.

Compaq introduces performance that will have business booming.

For one.

And all.

As PC technology has evolved, Compaq has been consistently among the first to tap its power. Now with the COMPAQ DESKPRO 486/25 and the COMPAQ SYSTEMPRO, Compaq brings new levels of performance to single and multiple users.



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For individual power users, nothing compares to the new COMPAQ DESKPRO 486/25 Personal Computer. It will let you work faster than ever before.

Every component has been designed to unleash the power of the new Intel 25-MHz 486 microprocessor. Power that drives numeric-intensive applications up to three times faster than 25-MHz 386-based PCs, outpacing many technical workstations.

The COMPAQ DESKPRO 486/25 was designed from the ground up to unleash the power of the 25-MHz 486 microprocessor.

It's power you can put to work on the most demanding applications. To handle CAD/CAM/CAE, statistical analysis, portfolio modeling, project management and multitasking.

The Intel 25-MHz 486 is the heart of the system. It employs a breakthrough design that integrates the processor with a numeric coprocessor (to speed number crunching) and an 8-Kbyte cache (to reduce wait states).

To boost performance further, Compaq added a second-level cache memory controller with 128 Kbytes of high-speed static RAM. Combined with interleaved memory architecture, it lets your data fly between the microprocessor and memory.

The 486 works in concert with COMPAQ Flex Architecture, which integrates a processor/memory bus with the new EISA I/O bus. This enables information to be processed at the highest possible speed while maintaining compatibility with 8-, 16- and powerful new 32-bit expansion boards.

The COMPAQ DESKPRO 486/25 is open for customization. Four megabytes of memory are standard, so you can run applications under MS OS/2 Version 1.2, MS-DOS or UNIX operating systems. If you need more, you can expand memory up to 100 megabytes using a separate high-speed 32-bit memory slot. That leaves up to seven EISA slots free for your choice of expansion boards.

You can work with up to seven internal storage devices, choosing from a range of high-performance fixed disk drives (the 650- and 320-MB models have 1:1 interleave and ESDI controllers). And you have the flexibility to use both 5¼- and 3½-inch diskette drives.

All told, you can store up to 1.3 gigabytes of data internally, or up to 2.6 gigabytes using the optional COMPAQ Fixed Disk Expansion Unit.

You can run the most complex CAD/CAM/CAE, scientific and business applications faster than ever before.

Compaq didn't stop there. Accelerated VGA graphics are built in, freeing an expansion slot. There's even a socket for an optional Weitek 4167 coprocessor that lets you blaze through calculations.

The COMPAQ DESKPRO 486/25. It's sure to bring a little thunder to your office.

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Every aspect of the COMPAQ SYSTEMPRO has been engineered to bring unprecedented total system performance and expandability to demanding connected environments.

This powerful combination makes it an ideal server to handle advanced local area networking. To take advantage of new client-server applications like shared databases. To manage multiuser transaction processing. And to act as a network bridge or mini/mainframe gateway.

Inside, you'll find a series of technological breakthroughs.

The first is a flexible system processor design that lets you work with both 33-MHz 386 and future 33-MHz 486 technology.

Initial models offer a 386/33 system processor that employs a 386 microprocessor optimized with a 64-Kbyte cache memory design and a socket for optional coprocessors. This drives software more than twice as fast as the IBM PS/2 Model 80, and surpasses most minicomputers.

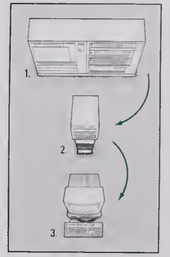
Computing potential can be increased up to four times by adding a second system processor. You can use two 386 processors now. Or work with a 386 and a 486, or two 486 processors in the future. So your investment is protected.

The multiple system processors are integrated into COMPAQ Flex/MP Architecture, which combines a separate processor/memory bus with the EISA I/O bus.

EISA delivers the fastest I/O performance, which is critical for data sharing. You can add up to six 32-bit network interface controllers for maximum server throughput. And you're ensured compatibility with 8-, 16- and 32-bit boards.

Users gain nearly instant access to fixed disk data with innovative drive array technology that transfers data up to four times faster than nonarrayed drives. It also supports the most comprehensive range of data protection features.

The COMPAQ LAN MANAGER 386/486 optimizes the new COMPAQ SYSTEMPRO for use in OS/2-based networks.



The COMPAQ SYSTEMPRO is a powerful network server and mainframe gateway, giving users the fastest access to departmental and mainframe data.

As you add more users and more complex applications, the COMPAQ SYSTEMPRO grows right along with you. It's the first PC to actually increase in performance when you add options like system processors or drive arrays.

It grows in other ways that are simply amazing. You can expand the 4 megabytes of standard RAM to 256 megabytes, use up to 11 expansion boards, work with 11 storage options and store up to 4.28 gigabytes of data.

You're also free to work in your choice of network and multiuser operating system: Novell NetWare 386, SCO UNIX System V/386, COMPAQ LAN MANAGER 386/486 and others.

The COMPAQ SYSTEMPRO. Get your group together, and watch them roar.

COMPAQ

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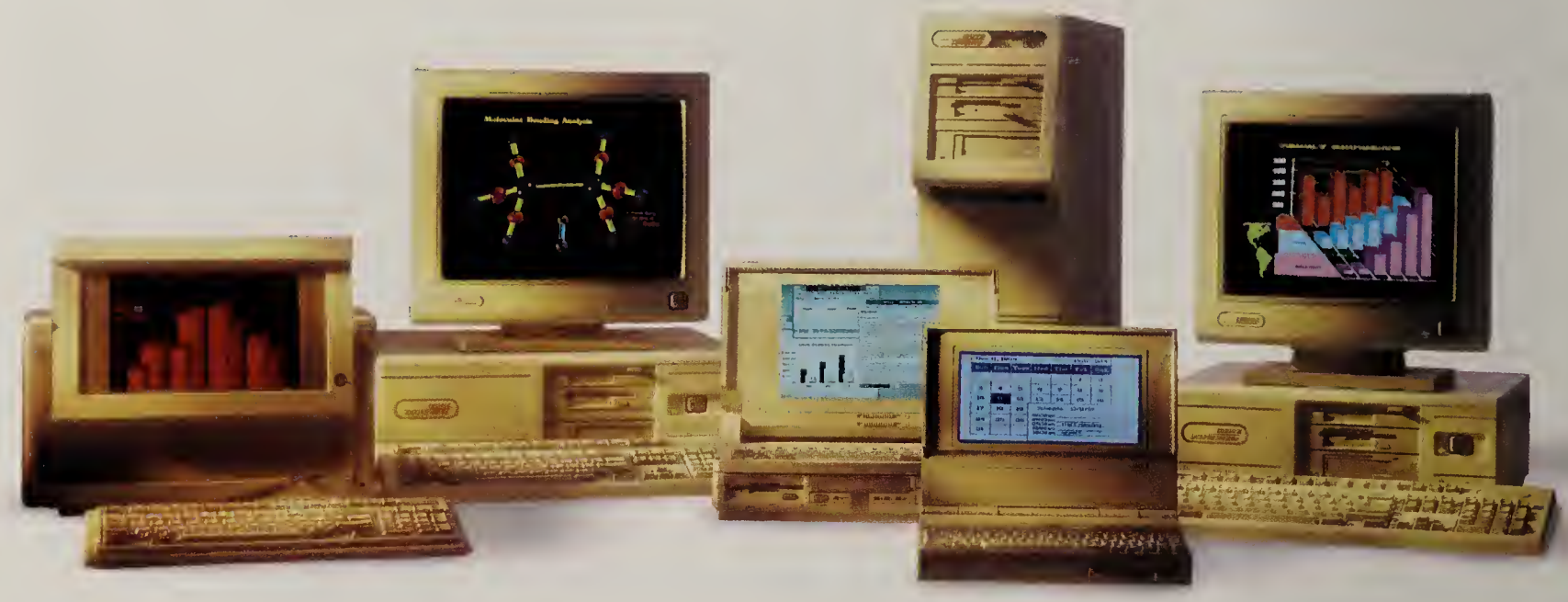
When it comes to performance, we believe actions speak louder than words.



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management believed that my background as a business-systems person would enable me to expand and direct these two functions, giving thorough attention to the process itself, in the context of the needs of the entire system.

So with process-management as the key motivating factor, I took the job. The opportunity to move to line management appealed to me. Furthermore, the customer-service function was the single largest customer of IS services in the group, so I knew my background would help manage at least one part of this operation. Over the next two years, this job change required learning on my part and patience from some of the chemicals managers. But it also put me in a position to lead the organization that would experience more than 50 percent growth during that two-year period.

The customer service and inside sales organization has two major components: operations and inside sales.

Operations handles end-user orders for the group: Sales-order coordinators take the orders and must ensure that customer requirements are satisfied, from order placement through proper and timely invoicing. Operations is also responsible for customer-complaint administration and inventory control at the more than 150 locations from which we ship.

Inside sales is a proactive, outbound telemarketing operation. Account managers in inside sales handle over 50 percent of the Chemicals Group's accounts and provide sales support to their customers over the telephone. In 1984, there were 40 people in customer service overall; operations was processing 180 orders a day, and inside sales accounted for about $4 million in sales. Currently, the customer service staff has grown to 60; order counts exceed 330 a day, and inside sales is responsible for $50 million in sales, with plans in place to grow to $70 million in 1990. As customer service has grown and prospered, I too have changed, capitalizing on my IS skills but also shedding some of my old ways while learning new ones.

"One instinct I had to unlearn from my IS days was taking a conservative approach in applying new ideas. My background built a strong bias toward trying a new approach only in low-risk, low-return areas, working out the bugs, and then cautiously extending the new way of doing things to the higher-return areas."

I attribute one early success directly to my analytical background as a systems analyst. When I started in customer service, I sat down with several sales-order coordinators (SOCs) to see how they processed orders; but I quickly became overwhelmed by exceptions. To better understand the department, I commissioned a brief time/motion study to categorize the activities of the coordinators in a more analytical fashion. One conclusion reached in this study was that SOCs spent about 30 percent of their time in "routine activities" (answering phones, keying in orders) and 70 percent of their time solving problems for customers.

This interesting data led to a breakthrough for the department. While the SOCs were responsible for satisfying customers, they were perceived in 1984 as performing primarily a clerical function. This perception limited their influence and ability to solve problems and satisfy customers. Using the 70 percent problem-solving statistic, we embarked on a major campaign to educate management that resulted in upgrading both the image and job position of the SOC. This upgrading has improved service to customers, since we now retain more dedicated and conscientious people. It has also strengthened the team atmosphere with business personnel outside of customer service.

When I moved from IS to customer service, one lesson I had to learn was the meaning of "customer focus." Satisfying those people who write all the checks to the Chemicals Group has added new meaning to the term for me. My first experience with an irate customer involved a demanding individual who complained that one of our sales-order coordinators had told his people that we could not ship their product because we were taking inventory. This was clearly an unacceptable response, and I could not believe the SOC in question had reacted in such a way.

I decided to find out what really happened. Tracing the origin of this problem was similar to a process we had followed in IS when a user at one of the plants complained that computer response time was unacceptable. We set out to determine both the average computer response time and what the user really needed for response time. In that instance, we conclusively proved that average response time met industry standards, so we felt the user should have been satisfied.

In the case of the chemicals customer, we determined that his representative had called the warehouse instead of calling a sales-order coordinator directly, as he should have done. Armed with this knowledge, we met with our sales rep to prepare to call on the dissatisfied customer. After meeting with the sales rep, I quickly concluded that proving the customer wrong would gain us nothing. The proper approach was to listen to the customer, discuss the best order procedure for him, and reach some agreement. From this experience, I adapted a version of an old saying: "The customer may not always be right—but he (or she) is al-

ways the customer."

My systems instincts were also instrumental in advancing the growth of inside sales. Top management, including the divisional sales managers, wanted to use our field sales force more efficiently. Part of the plan involved expanding the role of inside sales. To be cost-effective, however, an inside sales account manager would have to handle many times the number of customer accounts handled by a field salesperson. Automation was clearly needed, and an effort was underway to buy a telemarketing software package. However, none of the off-the-shelf solutions seemed to fit the bill.

The manager of inside sales and I discussed the software requirements. The more we talked, the more the individualized nature of the application profile seemed to fit the definition of personal computing. Also, given the still-evolving nature of inside sales, the situation seemed to call for prototyping, since the department's requirements were likely to continue changing. A limiting factor in our effort to automate, however, was that, for inside sales to be cost-effective, we could not afford an expensive development project.

We decided to cut a deal with the company's MIS department to build an application in a prototype environment based on a PC. Since no mainframe databases would be affected, we also agreed to use college co-op students (not MIS personnel) to do the system development on the PC, paying the co-ops about one-quarter what IS would have cost. With the co-op resource, PC architecture and a very high level of enthusiasm from the manager of inside sales and an account manager, we have developed and installed—quickly and at very low cost—a highly effective system to support the inside sales account managers.

One instinct I had to *unlearn* from my IS days was taking a conservative approach in applying new ideas. My systems-development and -implementation background built a strong bias toward trying a new approach or procedure only in low-risk (and low-reward) areas, working out the bugs, and then cautiously extending the new way of doing things to the really important, higher-return areas.

"Do I have any regrets about having moved to a line-management position? I am clearly losing touch with the technical aspects of IS. On the other hand, I'm gaining a much deeper understanding of the company's business and of our customers."

However, as a line manager with authority and responsibility to produce tangible results, I soon learned to have more confidence and to apply innovative ideas more quickly in high-return areas. For example, in order to speed our invoice time, we proposed a change to the approval procedure for setting discounted prices. The change entailed some risk of incorrect prices going out and causing customer complaints, but we built in controls to lessen this possibility. While my first instincts were to test it in a low-volume, low-dollar-value product line, after reviewing the idea with the business area we decided to run it in the product line giving the highest dollar return. The procedure reduced invoice time and was immediately implemented across the board, avoiding a protracted—though more cautious—line-by-line rollout. Thus, contrary to my IS training, we took a higher risk in order to reap the greater benefit.

We also wanted to improve our cash flow by reducing the time required to process and send out invoices. We had mountains of data developed to analyze the areas that customer service had traditionally managed. However, we had not looked at the entire process—from shipment reporting through actual delivery of the invoices to the post office.

Broadening the scope of the effort revealed new opportunities, such as one we discovered that lay in simple geography. We noted that after invoices were printed each morning, they were shuttled first to the building where accounts receivable (AR) was located, then back to their point of origin to be mailed. This practice dated from a time when invoices were printed by IS, which was located next to the AR department, which in turn was located next to the mail room. This once-convenient routing pattern continued despite the company's growth, despite AR's move to a new building, and despite the fact that the shuttling added at least half a day to invoicing time. With a simple change to invoice printing, we automated the process and eliminated the shuttle bus and AR step. Now customer invoices go directly to the mail center, which gets them to our customers more efficiently.

Do I have any regrets about having moved to a line-management position? I am clearly losing touch with the technical aspects of IS. On the other hand, I'm gaining a much deeper understanding of the company's business and of our customers. To other IS professionals who have made such a change, I would suggest that you quickly delegate any demanding role you currently have in a systems project—even in your new area—and get into the business-management dimensions of the new job. And remember that you bring special skills with you, not the least of which is the ability to view business functions as processes that can be improved. With that in mind, the shift to a line position can be a rewarding experience indeed. CIO

R. Terry Haas manages customer service and inside sales for the Chemicals Group of Air Products and Chemicals Inc., of Allentown, Pa.

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THE BEACH IS BACK

After some cloudy years, the sun is out again in Miami Beach. Better yet, developers, businesses and upscale residents are returning to neighborhoods IT has helped to rejuvenate.

BY
ALLAN E. ALTER

PAUL GIOIA *declares a new heyday.*

PHOTOS COURTESY OF THE CITY OF MIAMI BEACH

Can information technology help a declining city become prosperous again? The City of Miami Beach is making a persuasive case for answering 'yes.'

Sand and sunshine made Miami Beach one of America's premiere resorts in the 1950s and '60s. But by the early '80s, Miami Beach had fallen on hard times. Competition from new vacation resorts, an influx of elderly residents on fixed incomes, the flood of Cuban refugees who arrived in the Mariel boatlift in 1980, as well as misguided city government policies brought poverty, drugs and crime to the city and drove away business and developers.

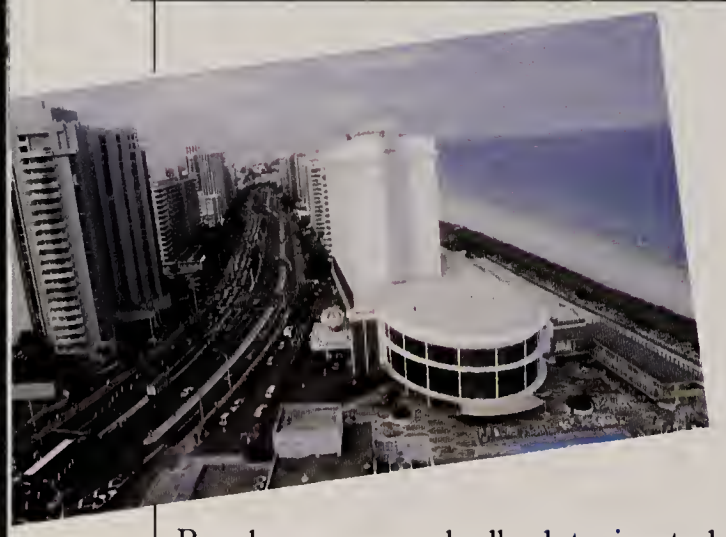
A new city government came to power in 1983, pursuing a new economic-development policy and a different approach to information technology. The change appears to be bringing the good times back to this city of approximately 100,000.

According to City Manager Rob W. Parkins, the city government is making "measurable progress" toward its major goals—attracting new residents, developers and businesses. Young Miami-area professionals and their families are moving to Miami Beach, according to a 1988 study conducted by the city government. Property values began to rise in 1986, and have now regained the previous high recorded in 1983. Likewise, developers are returning to town: The first major new resort hotel in 20 years and an ambitious performing-arts center are in the works.

Signs of returning prosperity are visible throughout Miami Beach. Older buildings, including the trademark art deco towers of downtown Miami Beach, are being refurbished. A marina and a new convention center capable of holding 30,000 people, have been built. Boutiques are beginning to return to Lincoln Road, an exclusive shopping district in Miami Beach's heyday. And the South

PHOTO BY JOSE FERNANDEZ

ROB W. PARKINS *reports that city hall's major goals are well on the way to being met.*



Beach area, once badly deteriorated, has become a fashionable residential district and a center for nightlife.

Information technology, although less visible than the fancy shops and art deco hotels, is just as much a part of the Miami Beach renaissance. Today's Miami Beach is a place where computers help drive out slumlords, board up crack dens, and tear down abandoned buildings. IT has made it easier for developers and businesspeople to invest in the city. Systems have had a hand in increasing arrests, luring young, affluent residents, and keeping city finances stable.

To encourage economic development, city officials had to find a way to cut the Gordian Knot of poverty, crime, sub-standard housing, and a deteriorating infrastructure. The city, especially in the South Beach area adjacent to downtown, was laced with abandoned buildings, drug dens and run-down housing. Miami Beach's two-year-old "land-management" computer system tracks information that has made it possible to wrest these sites from slumlords and make them easily available to developers. The result is attractive new housing and safer neighborhoods, which have been a magnet for younger, more affluent residents and merchants. So far, 270 buildings have been demolished or refurbished, according to Paul Gioia, director of the Building Department. New construction in Miami Beach has increased from $60 million in 1988 to $230 million in 1989. "It's a heyday for us," said Gioia.

Miami Beach's land-management system, from Sierra Computer Systems Inc. of Visalia, Calif., resides on a Hewlett-Packard 3000 and is accessed from HP microcomputers. (Other locales that use the Sierra system include King County, Wash. [Seattle]; Beverly Hills and Santa Monica, Calif.; Tempe, Ariz.; and Hillsborough County, Fla.) The system contains a vast database of information: crime statistics, tax-assessment data, building-code and other violations, business licenses and permits, and building safety certifications. It also contains neighborhood characteristics (such as whether it is residential, commercial, or both, or has single-family or multi-family housing).

The data comes from various city departments as well as commercially available sources. "Nothing escapes us now," said Gioia. "We know every building out there."

Buildings that are cited for safety violations, unsanitary conditions and criminal activity are targeted by a

PHOTO TOP: JOSE FERNANDEZ; PHOTO LEFT: COURTESY OF THE CITY OF MIAMI BEACH

special interagency task force on abandoned buildings. Once identified, these buildings are presented to the city's Unsafe Structures Board. The owners are given 30 days to obtain permits to fix the buildings. If they don't, the buildings are demolished or boarded up and made "uninhabitable and impregnable," Gioia said.

"In this way, Miami Beach can rid itself of havens for crack," Gioia continued. "This gets rid of the slumlord syndrome of the past. Before, slumlords said 'I'll let them catch up with me.' Now, they are right in front of our noses." And any high-handed landlords who try to sidestep the Board by appealing to City Manager Parkins are wasting their time. Parkins said he can call up the building on his own PC, and show the landlord the city's records of violations, reports and complaints.

Information technology, although less visible than the fancy shops and art deco hotels, is part of the Miami Beach renaissance. Today's Miami Beach is a place where computers help drive out slumlords, board up crack dens, and tear down abandoned buildings.

Demolishing buildings has its advantages, said Gioia. "It's more appealing for an entrepreneur to see empty lots on the beach, rather than deteriorated buildings."

Miami Beach's city government has made a fundamental policy choice. Unlike some other local governments, which have devoted their IT efforts to improving the delivery of such social services as welfare, Miami Beach has chosen to focus on encouraging developers and business to come back to the city. (In any case, according to Parkins, most social services are provided by the county.) The same computers that may trigger the boarding up of poor residents' apartment buildings are later used to help find them new homes. However, the primary goal of the city's IT use is a resurrected Miami Beach that will be an expensive place to live, according to Eddie Cox, Parkins's executive assistant.

But IT does more than give a green light to bulldozers. Through the land-management system, developers can quickly obtain accurate information about available sites and existing structures. It has also simplified and sped up the planning and permit process.

"If someone wants to open a business, they can get a permit in two hours," said Gioia. Major real-estate developments, which formerly took from two to four months to be approved, can now be done in one to four weeks. Records are no longer lost, permit clerks work more quickly because the turnaround time on an application is monitored, and the computer creates a permanent record of which proposals within a plan are approved and rejected, according to Gioia.

This system sends an important message to the business community, he said. "If we can get out a permit in one day, does that create an [atmosphere] where you want to establish your business here? We say yes. When a community such as ours creates an environment committed to economic development, people feel it."

Miami Beach's land-management system has found other uses. It helps the city find new homes for residents of condemned buildings. The system notifies the city of any buildings that are due for safety inspections. And city officials rely on the system to identify areas where development is lagging, and plan development efforts.

As part of Miami Beach's state-

STUART ROGEL *relies on computer-generated photos (left) and a database of demographic information to impress would-be developers of the city's renewed vitality.*

PHOTO RIGHT, JOSE FERNANDEZ; PHOTOS CENTER, COURTESY OF THE CITY OF MIAMI BEACH

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funded "Safe Neighborhoods Project," the Department of Economic and Community Development (DECD) compares crime statistics with neighborhood characteristics, according to DECD Director Stuart L. Rogel. "The crime statistics tell us which neighborhoods to focus on, and where the physical improvements [to street lighting, landscaping and sidewalks] need to be made," Rogel said. The DECD relies on a computerized mapping system, which incorporates some of the same information used in the land-management system, to track which neighborhoods and buildings offer developers certain tax breaks. "When you fix storefronts on a certain street, you can get more bang for your dollar than in another area," Gioia said.

Salesmanship and public relations are as vital a part of economic development as is planning. Rogel must sell developers and businesspeople on Miami Beach, and the land-management system provides him with the ammunition he needs. Should a potential investor call for specific information, the database can come up with it quickly. If someone wants a list of available properties, the system can print an up-to-date list. Rogel's department scours the database to identify favorable economic and demographic trends in Miami Beach. In addition to using it for the city's planning purposes, this data is publicized through press releases and reports designed to lure potential investors and residents. The "city on the upswing" message is getting out. The *Miami Herald* and other local publications have published several upbeat articles on Miami Beach, based on this data.

The 'city on the upswing' message is getting out. The local media have published several upbeat articles based on computerized demographic data.

Rogel also uses computer-enhanced photography to help sell potential projects to city officials and the public. "We take a picture [of a site], digitize it, and make physical changes to the scene, as seen before and after [the project]. It's an effective way to show recommended improvements to the public." And city planners use this technology to analyze and hone their ideas. "It's easier to make a building smaller on a computer image than go back to the drawing board," said Rogel.

Rogel's and Gioia's departments expect to get even more out of the data contained in the land-management system once it is integrated with a geographic information system, now under development. "It is going to be very easy to produce maps, graphics of anything," said Jaime A. Mitrani, assistant director of the Building Department. "For example, if we want to shut down a water main, it will tell us how many people will be affected, and then produce letters [giving notification] to these people."

Drugs and crime have badly tarnished Miami Beach's reputation and hurt its economy. The land-management system has helped eradicate crack dens, but it is only

Beach Blanket Bingo

A permissive, CIO-less environment has given the city's IT experimenters room to stretch out

Miami Beach's IT policies sound like the brainchild of a strategic mastermind. But don't be deceived. Kenneth Kraemer, a University of California-Irvine professor who wrote a 1987 study on Miami Beach's use of IT, was closer to the mark when he wrote that Miami Beach exemplifies the principle of "reforms as experiment."

Unlike the politicians who ran Miami Beach until 1983, whom Kraemer described as a do-little "caretaker government," the administrations of mayors Malcolm Fromberg and his successor, Alex Daoud, have been "committed to action to solve the problems of Miami Beach"—even if unsure of the consequences of those actions.

Miami Beach does not have a CIO; line managers have been the real force behind the city's IT efforts. City Manager Rob W. Parkins has encouraged IT experimentation, entrepreneurship and managerial collegiality—creating a supportive atmosphere that allows energetic young officials like Stuart Rogel and Peter Liu to share ideas and initiate

PETER LIU *(left) and* **ROGEL:** *intrapreneurs*

PHOTO BY JOSE FERNANDEZ

systems, such as one used for land-management purposes (see main story).

Carlos Mendez, the MIS director between 1983 and February 1989, was credited by Parkins and Liu with supporting their efforts. But Mendez had little choice: According to Kraemer, Mendez and his staff were too busy rebuilding the MIS department, converting from a Burroughs mainframe to a Hewlett-Packard (HP) minicomputer and installing the HP-based systems to also manage and master microcomputers. Neither Mendez nor his successor, Frederic Braeseker, have been given the strategy-making responsibilities of a CIO—although, Braeseker noted, some ideas for strategic systems remained hypothetical until MIS became involved. Still, department heads could easily sidestep MIS, and have.

Not every experiment has worked. The city's attempts to use document scanners to convert documents from a stand-alone word processor to PCs were a failure, according to Liu, as was an effort to standardize on Lotus Symphony as a PC database. Braeseker said a home-grown predecessor to the city's new computer-aided dispatch (CAD) system not only failed, but set back MIS's relationship with the police department.

Enough of these efforts succeeded, however, to help revive the city. But now the unanticipated consequences are coming home to roost. There is no formal support for the city's PC users—they rely on PC gurus such as Liu for assistance. Some who did an end run around MIS and installed their own PCs now blame the department for not providing support. Except within the MIS department, there are no local area networks. Some city staffers still have to manually re-enter data to transfer information from one program or PC to another. To avoid backlogs, Braeseker's boss, Executive Assistant to the City Manager Eddie Cox, mandated purchasing software instead of developing software in-house. But this has created other problems: The new CAD system, purchased from a software vendor, has suffered from bugs, crashes and lengthy delays.

Thus, Braeseker reasons that the MIS director's role will become more significant as the need for consolidation, integration and user support increases.

—A.E. Alter

PHOTO COURTESY OF THE CITY OF MIAMI BEACH

one part of the city's computer effort to control crime.

Ken Glassman, who served as police chief from 1984 until just last month, said "we were a totally manual, unautomated police department" until 1987. The city's MIS department is now creating an automation package that Glassman said "will encompass just about every aspect of police-department [operations] when completed."

The heart of the system is a brand new computer-aided dispatch (CAD) system for both the fire and police departments. In the past, police 911 operators wrote out complaint cards and sent them to dispatchers. Operators now type the information into the CAD system, which relays it to a dispatcher. The system tells the dispatcher which police units are available to answer the call. It also advises the dispatcher on which police units should be sent, and assesses the call's level of emergency. "This is a great assist to the dispatcher," said Glassman. "It [eliminates] a lot of individual decision-making that was very often discretionary."

The CAD system includes South Florida's first 911 system that can identify the phone number and address the caller is dialing from. Glassman said it has enabled the police to aid a number of people who dialed but could not communicate further. The system also notifies dispatchers of other 911 calls originating from that address in the last 24 hours, so police answering the call can be informed of previous incidents.

In addition, the Miami Beach police last year booted up a criminal records database system. It not only stores all information received by the CAD system and other police records, but includes a crime-analysis package. This part of the system evaluates crime trends and patterns, and can help predict where certain crimes are likely to occur—helping the Police Department deploy personnel and resources. According to Glassman, the automation of police records has made it simpler and faster to match crime data to suspects, and process the 13,000 arrests that take place annually. But for the sake of security, narcotics arrests, suspects and data are tracked and analyzed on a separate, stand-alone system.

The Miami Beach police used money seized from drug dealers to set up an automated fingerprint-identification system. The system allows prints taken from a crime scene to be compared with the fingerprints of everyone arrested in the last two years in Dade County, and soon the entire state of Florida. Glassman credits the fingerprint identifications made by the system for "tremendously increasing the number of arrests."

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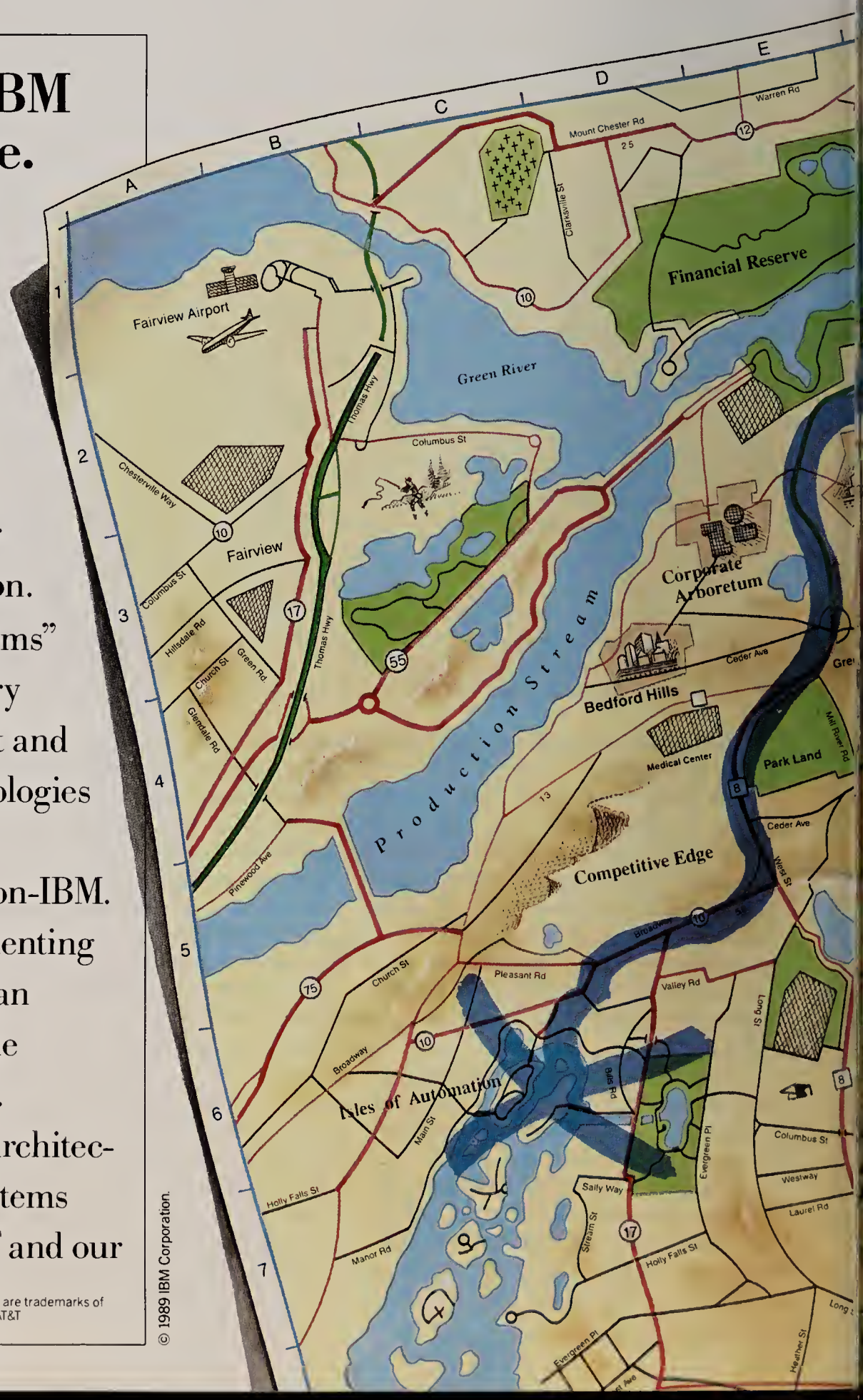

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LIU, *an active proselytizer of PC use, parlayed his zeal into a number of computing initiatives, among them a financial trend-monitoring system.*

The police are now experimenting with mobile digital terminals for squad cars, according to Glassman. These will allow officers to conduct a computer check of suspicious individuals and cars directly from police cruisers. Currently, officers must ask dispatchers to conduct computer checks for them. The new system, Glassman believes, will put an end to the wait for a free dispatcher. Laptops and electronic mail for officers are on the way, he continued. "This will save us a lot of valuable time now spent just handling paperwork and reports," Glassman said, and eliminate data entry staff.

Nevertheless, Glassman refuses to claim that technology has reduced crime in Miami Beach, or that it is primarily responsible for the city's higher arrest rate. "What we can say is that computers help us be more efficient and find information that we have stored away. [Technology] is a tool to help us do our job, no question." Ironically, said City Manager Parkins, because Miami Beach now has "a better system for reporting crimes, we now have a higher crime rate."

Two of the greatest enemies of government are runaway spending and out-of-whack budgets. Without funds, programs wither. And controlling finances can be especially difficult for depressed municipalities with diminished tax bases. Managing the budget has been the job of Peter F. Liu, director of Miami Beach's Office of Management and Budget (OMB). Liu was a leader in the drive to use computers as a tool for fiscal stability.

"When I joined the city in 1983," he said, "the budget was prepared manually on calculators." The city's financial records then resided on a mismanaged Burroughs mainframe that was unable to download to PCs.

Liu arrived in Miami Beach after the decision was made to move the city's financial data to a Hewlett-Packard 3000 that had been purchased by the previous administration but never used. A diehard PC user and missionary, he pioneered the practice of down- and uploading the HP data to PCs for financial and budgetary analysis. Not only did he introduce PCs to OMB's staff, but he eventually won over most financial managers in other departments to microcomputers. According to Liu, OMB uses the HP 3000 as a giant spreadsheet to analyze budget data on a citywide basis, while departmental financial managers prepare their budgets on their own PCs. In addition, the HP 3000 gives Liu the ability to monitor real-time financial data and generate detailed financial reports.

One of Liu's more important initiatives was the creation of a PC-based financial trend-monitoring system. It uses city and state financial data to analyze current and projected expenditures on a quarterly basis. Together with the city's practice of closing its books monthly, the system has helped "ensure the financial health of the city on a day-to-day basis," ac-

PHOTO LEFT, JOSE FERNANDEZ; PHOTOS RIGHT, COURTESY OF THE CITY OF MIAMI BEACH

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cording to Liu. "It helps ensure that funds are available to carry out programs, by projecting whether a department will be under or over budget for the year. This enables departments to take quick corrective action, he said. For example, police-department overtime is always a problem. We can better monitor their overtime expectations and projections."

As with Rogel, Liu uses computers to make his case to other officials and the public—in particular, with laser printers and graphics packages. "Seventy to 80 percent of our work in budget is to prepare presentations, to influence policy. Anyone can add 2 plus 2. It's how the four is presented."

According to City Manager Parkins, Liu's computer advocacy has inspired others to automate. For example, the City Attorney's office now mails diskettes containing contract proposals and pleadings, rather than paper. "If we make a counteroffer, we don't have a document with a million amendments going back and forth," said Liu. "It saves time retyping, and results in professional looking documents." The personnel department uses PCs to track applicants for positions. And recently, Liu computerized the climate-control and energy-management system in City Hall.

"We have saved a lot [of money] through computers in general," said Liu. "I have no idea how much, and I refuse to think about it. It's academic. The value of computers is getting the product out, the program done. We are in the business of providing an immediate service. If we keep other people happy with fast, reliable information, we are doing what we, in government, are supposed to be doing." CIO

PHOTO COURTESY OF THE CITY OF MIAMI BEACH

"If someone wants to open a business, they can get a permit in two hours. If we can get out a permit in one day, that creates an [atmosphere] where you want to establish your business here. When a community creates an environment committed to economic development, people feel it."

—Paul Gioia

TECHNICAL PROFILE

Central Computer Systems: The City of Miami Beach uses two Hewlett-Packard (HP) 3000s (Model 70) for its City Hall-based applications. Two additional Model 70s are used together by the police and fire departments for computer-aided dispatching (CAD) and police records. A DEC Microvax will be used as a central switch for local inquiries to the Florida and national crime information centers from the city's fleet of 75 mobile digital terminals in its police vehicles. One HP Model 48 is dedicated solely to program development.

The central systems are linked to approximately 194 HP terminals and IBM-compatible PCs running in terminal-emulation mode, which service a multitude of citywide applications. Police incident information from the CAD system is downloaded to PCs, as is data from the land-management system, which is entered into a graphics-based PC display system. In addition, meter readers working for the Public Works Department use hand-held devices from Itron (Spokane, Wash.) to record meter data; the data is transferred to PCs and from there to the central system.

Software: The HPs use the MPE Operating System, along with the IMAGE database-management system for virtually all applications.

The city's 140 PCs run exclusively under DOS. Most are used as stand-alones, but networking and device sharing is being implemented to more effectively use these computers.

The city's land-management system is built around PERMITS (Permit Information Tracking System), from Sierra Computer Systems Inc. of Visalia, Calif. The fingerprint-identification system comes from De La Rue Printrak Inc. of Anaheim, Calif.

For PCs, the city has standardized on WordPerfect for word processing, Lotus Symphony for spreadsheets, and Ashton-Tate Corp.'s dBASE III+ and Symantec Corp.'s Q&A for databases. The Department of Economic and Community Development is using MapInfo as its geographic information system.

Communications: The city's computer center is located in the police department facility. Communications to City Hall and off-premises terminals are accommodated via a series of Codex 6740 quad network ports with statistical multiplexors. This circuit employs trunking via land-based telephone data circuits. The city's 2.0 GHz microwave backbone will soon replace all leased-line data circuits.

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In the intensely competitive freight-transport industry, leading players are using IT to help insinuate themselves into their customers' operations

TRUCKS, SHIPS, PLANES, TRAINS AND BRAINS

BY MEGHAN O'LEARY

Once part of a highly regulated, stable industry, today's freight transport company is relatively unfettered by laws about what it can carry and where it can carry it. Since deregulation, competition has heated up as carriers scramble to win and keep increasingly demanding customers in a market where supply far exceeds demand. "Service" has become the industry watchword among freight carriers now that market conditions have put the customer in the driver's seat.

Recent trends toward business globalization, as well as the past decade's deregulation of trucking and railroads set off

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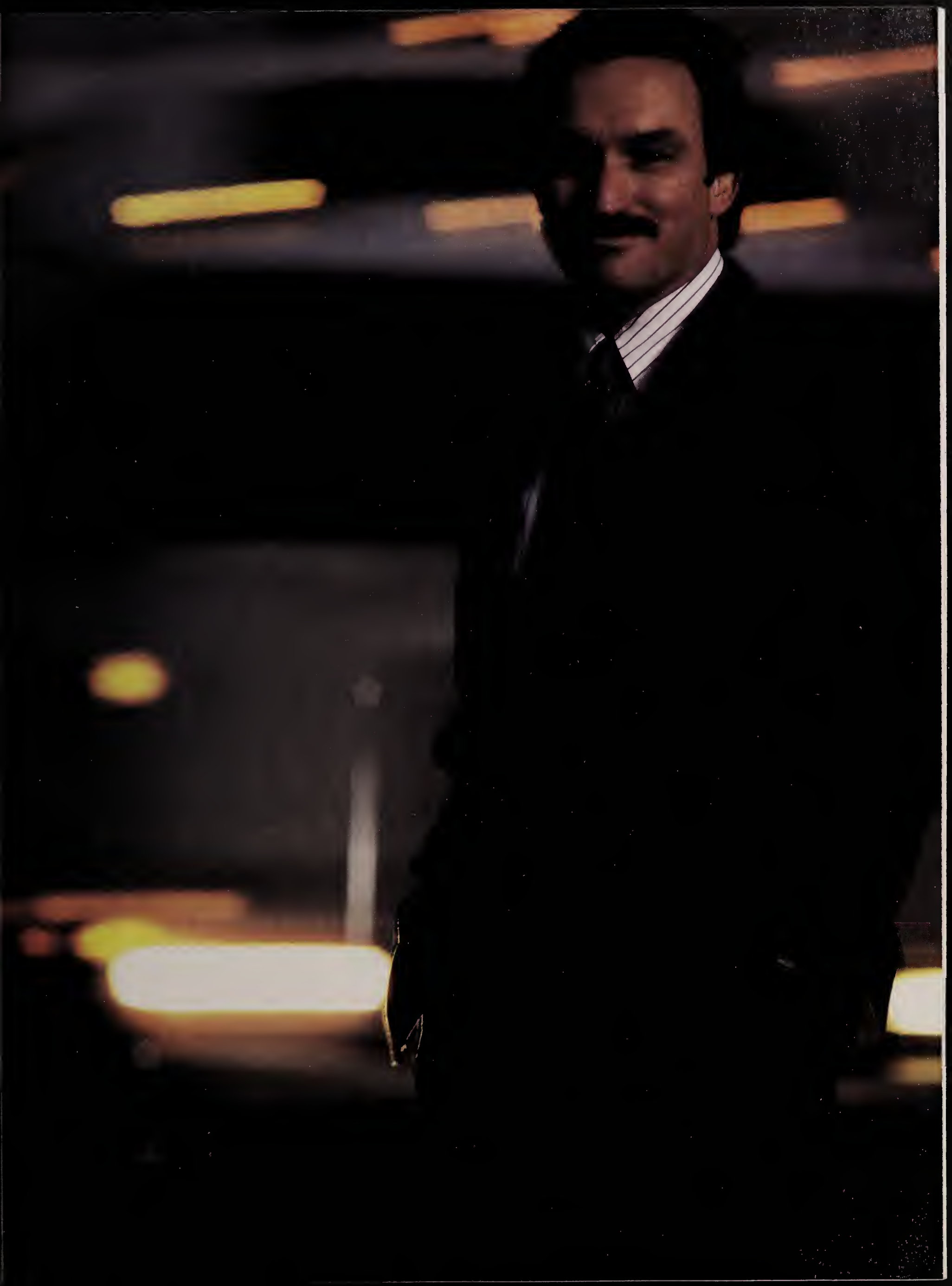


MICHAEL T. BOHLMAN: *An expert system is under development that will manage the deployment of cargo in freight yards.*

the competitive explosion among freight carriers. The possibility of losing lucrative business to more flexible, farther-reaching, deregulated competitors galvanized kings of the road, skies and seas to convert to IT-based operations to provide valuable customer services, as well as to streamline their own administrative operations.

Stiffer competition forced carriers to focus on cementing their relationships with clients, any one of whom might be snatched away by a carrier offering better rates or faster delivery. Carriers recognized that timely information—from the location of a current shipment to the cost of a future shipment—was a valuable commodity in the customers' eyes.

Today's freight transport company must do more than just show up. Carrier and customer have become partners in the customer's business.

As a result, computer-based shipment-tracking systems that once served only as inventory management systems for carriers have become tools for clients as well. Along with access to cargo status information has come a host of front-end shipment management applications that customers can use to place orders, print bills of lading and check their financial accounts with carriers.

Tracking goods across state and national boundaries and meeting changing customer needs requires an exhaustive and well-implemented IS strategy. The nature of the relationship between carriers and commercial customers is particularly well-suited to close electronic ties, but also demands a lot of those ties. A carrier with a big manufacturing customer commonly escorts freight from the assembly line to the retailer's door, perhaps even shipping the parts to the manufacturing facility.

Today's freight customers—known as "shippers" in the freight industry—are increasingly involved in just-in-time (JIT) inventory, direct-store delivery, electronic data interchange (EDI) and quality control. "JIT and quality processes are driving customers to be more demanding," said David J. Cape, president of Princeton Transportation Consulting Group Inc. in Princeton, N.J. Customers are measuring cost-effective services as well as profits, and they rely, at least in part, on the carrier's ability to deliver freight according to exacting schedules and specifications. A case in point is a supply train belonging to Norfolk Southern Corp., in Norfolk, Va., that carried auto parts from the Midwest to assembly plants in Atlanta. The auto assembly schedule was so tied to the train's on-time

PHOTO BY JOSEPH BERGER

performance that the train was nicknamed "Sparkplug."

Such responsibility to customers has added a new dimension to the business of freight transport. Carriers no longer define their businesses simply as transportation. The carrier is now a distribution manager, taking care of reordering and maintaining inventory levels and identifying delivery problems before they happen. Distribution services and involvement in the manufacturing process have thrust freight companies into the "logistics management" business. As a consequence of customer demands, today's freight transport company must do more than just show up. Carrier and customer have become partners in the customer's business.

Under ideal conditions, logistics

Railroad Ties

A rail-industry trade group's IS subsidiary provides networked support to major railroads throughout the continent

Henry W. Meetze works for the Association of American Railroads, but he says he's no lobbyist. As president of RAILINC, the for-profit DP subsidiary of the AAR, Meetze is more interested in serving his industry with tools than with laws. "A lot of trade associations do nothing but lobby on the Hill," he said. "The AAR . . . provides a lot of centralized services for the industry."

These services are embodied in RAILINC's continent-wide communications network that helps railroads manage their shipments. Spanning Canada, the U.S. and Mexico, the system links all the major railroads in these countries. Begun in 1975, the network has two major functions: It supports RAILINC's equipment information system, and it acts as a store-and-forward messaging system for railroads across the network. The latter was the first use of EDI in the industry, according to Meetze. He believes the network reflects a decade of changes in the railroad industry.

"The biggest thing that's happened in the railroad industry in probably 100 years is the passage of the Staggers Rail Act in 1980 that partially deregulated the industry," he said. Meetze sees deregulation as having forced railroads to take advantage of technology. "It freed us from a lot of the regulatory restrictions that existed for about 100 years: It allowed us to set our rates more quickly, . . . to enter into contract rates with shippers, and to divest ourselves of unprofitable track. All those things have really allowed us to [take steps] to address the revenue and the cost side of the equation.

"Automation has continued to help the industry survive the recession of the early '80s," he added. As a result of automated tracking and shipment management, "our safety has improved, loss and damage payments have declined, efficiency has improved, employment has been reduced by about 47 percent."

HENRY W. MEETZE: *coordination among competitors*

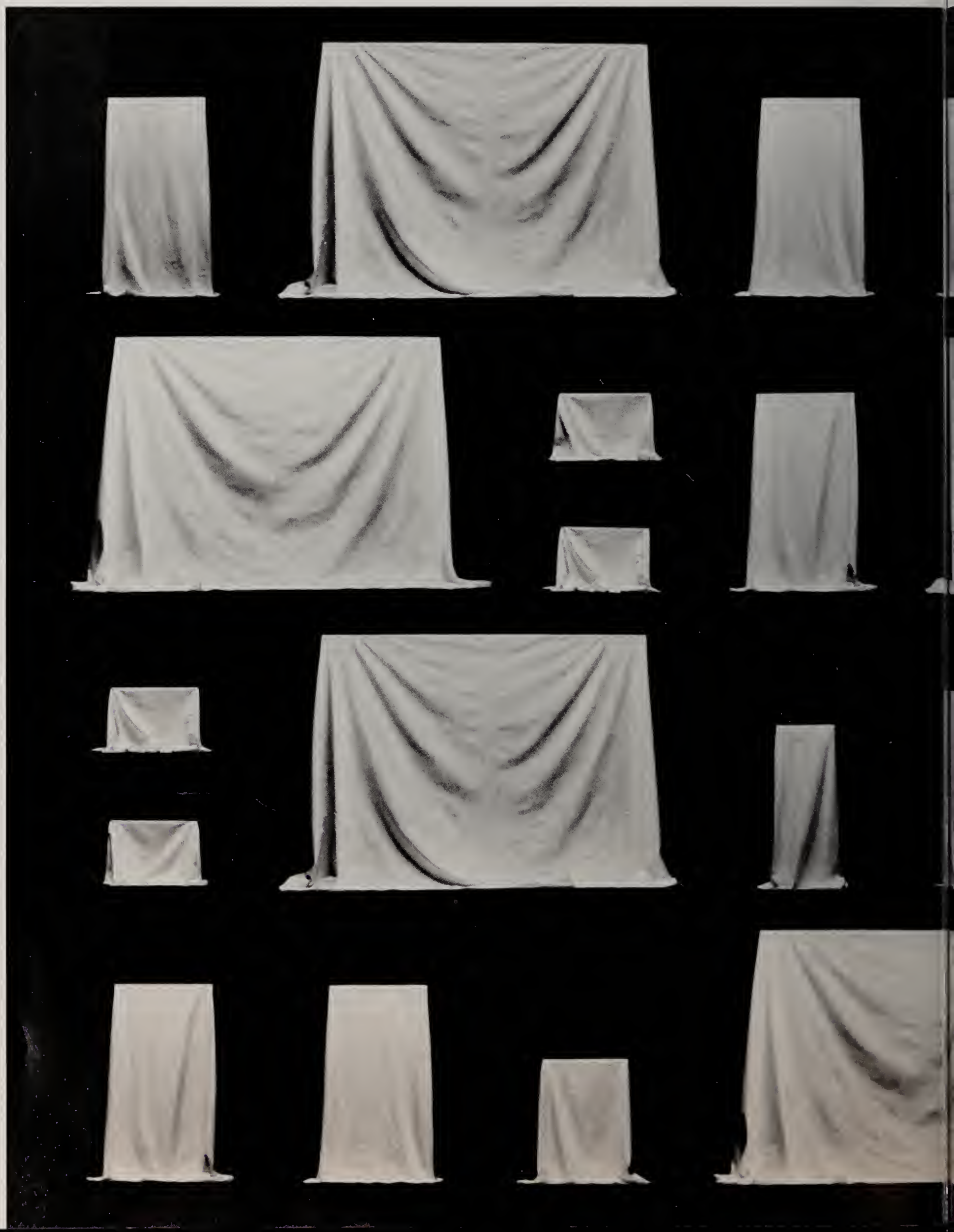
RAILINC's cargo-tracking system has contributed greatly to the improvements in efficiency, according to Meetze, as has the group's Advanced Train-Control System (ATCS). The system receives information about 1.4 million car moves a day from member railroads. ATCS monitors and directs the flow of traffic across the nation's many railroad systems—in effect, treating them as one large rail system. "Sixty percent of [shipping] moves involve two or more railroads," Meetze said.

In conjunction with RAILINC's EDI services, ATCS allows railroads to optimize car space and provide service to their customers. In 1980, RAILINC opened its network to the shipping community in response to requests from RAILINC members who worked with the major auto manufacturers. RAILINC developed demand forecasting, rail yard management and scheduling modules for those members, "so as to minimize the empty car-miles that they move," said Meetze. "Every time one of our cars moves an empty mile, it's moving at a loss." The system has saved RAILINC members about 200 million car-miles a year at 35 cents a mile, by Meetze's estimate.

Meetze consistently uses the first person plural when discussing the forward strides his industry has made. It reflects his interest in helping the industry as a whole regain lost market share and revenues, despite the competitive concerns of individual railroads. "Railroads compete with one another," he admitted, in order to survive the competitive onslaught of the non-rail freight carriers, "but they also have to coordinate with one another." —*M. O'Leary*

PHOTO BY MANUELLO PAGANELLI

If IBM and DEC had their way, you'd



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JONATHAN PAVLOFF: *There is an ante of added value that every carrier is expected to throw in.*

management is an exact science. Data on the whereabouts, weight, condition and nature of shipments—in trucks, railroad cars or shipping containers—is sent to a carrier's central computers, generally from a terminal or distribution hub when the cargo arrives at or passes through the hub. The cargo may be identified manually, or it may be bar-coded and the information scanned into a computer at the terminal site. The same process occurs at delivery locations. The less human intervention that's required for the transaction, the less costly and prone to error the transactions will be. Once in possession of such data, a carrier can plan routes, bill customers, verify delivery or remedy mistakes or delays in transit.

The exactitude provided by tracking systems is especially important in the delivery of high-value goods and time-sensitive materials. Based on the performance of its computerized tracking systems, The Bekins Company, a trucking firm based in Glendale, Calif., offers a money-back guarantee on its high-tech delivery service. Bekins handles customer equipment delivery for Eastman Kodak Co. and Digital Equipment Corp., whose customers want the equipment on time and in one piece. The system, known as TimeLok, operates like an airline on the ground, according to Bekins' Vice President and CIO Larry Marzullo (see related story, Page 44), tracking shipments electronically between 40 Bekins facilities in the United States. Bekins guarantees TimeLok delivery at a specified time from any point in the country. While the company determined that satellite tracking of its vehicles was probably killing a fly with a sledgehammer, it did install cellular telephones in all of its trucks.

> *"Shippers aren't willing to give up their leverage on price, but they will continue to expect and extract additional services" in exchange for giving carriers the business.*
>
> —*Jonathan Pavloff*

Sea-Land Service Inc., a subsidiary of CSX Corporation that calls itself the country's largest shipping company, takes tracking one step further. Microwave transponders send information about the location, weight and temperature of containers to an antenna at the company's headquarters in Elizabeth, N.J. According to Director of Technology and Planning Michael T. Bohlman, the antenna passes the signal to a LAN, which then passes the information to the company's mainframe. Now undergoing a 5,000-container pilot test in Anchorage, Alaska, the Automatic Equipment Identification (AEI) system will eventually track all of Sea-Land's 110,000 containers. Bohlman said he hopes the system will allow Sea-Land to attract customers with time- or temperature-sensitive shipments who might otherwise send them by air.

Carriers involved in bringing these electronic tracking services to their clients also gain an advantage by giving them tools with which to manage their shipments and interface easily with the carrier's computers. Efficient ordering and invoicing saves money for shippers as well as carriers. Because of this, many carriers offer their shippers such value-added services as EDI for ordering and invoicing, and PC software for checking their accounts, figuring out shipment costs and tariffs, sending shipping instructions, and generating shipping documents. Some carriers have seen a great deal of interest in electronic funds transfer (EFT) from their customers as well.

"Within the industry, there [is] a kind of common application core that everyone offers," explained Jonathan Pavloff, president of Summit Information Systems Inc., the wholly-owned subsidiary of Roadway Express Inc., of Akron, Ohio, that runs the trucking company's information systems.

Summit's offerings to customers include PC-based software for shipment tracking, historical analysis, electronic invoicing, creating customer databases and printing labels and bills of lading. "You need to have those services just to play the game," Pavloff said. Trucking companies have more capacity than available business. "Shippers aren't willing to give up their leverage on price, but they will continue to expect and extract additional services" in exchange for giving carriers the business.

According to Pavloff, the benefits to the customer are not just adminis-

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trative. "A lot of the customer services in terms of EDI . . . are in response to helping our customers with their customers," he said. For example, Summit offers automatic purchase-order verification to its retail customers to help eliminate the administrative headaches associated with suppliers shipping to them on invalid PO numbers.

In addition to helping similar types of freight transporters compete with each other effectively, tracking systems have allowed many carriers to expand into other forms of transport while still tracking their cargo through a more complex transit network. Having watched their market share be gobbled up by flexible trucking fleets that can pick up and deliver door-to-door, railroads have been especially keen to diversify in order to give their customers end-to-end service. "Shipping by rail is cheaper, but the [level of] service is much less," said Princeton Transportation Consulting Group's Cape.

Norfolk Southern's Triple Crown Service Inc. subsidiary in Fort Wayne, Ind., has succeeded in recapturing traffic lost to the highway with its RoadRailers—trains of specially designed, 48-foot trailers that convert to trucks at terminal points. The company's tracking system allows it to follow freight along tracks or on highways.

To handle large volumes of freight as easily as single truckloads, Sea-Land is developing a sophisticated terminal-yard inventory system to

Square One

Given the problems of trying to blend new and old technologies—and organizational practices—most CIOs would envy Larry Marzullo's chance to start from scratch

MARZULLO: *Every strategy is based on IS.*

In the rush to turn IS into a competitive tool, many freight transporters are building information systems and management structures designed for a radically changed industry, and trying to fit them atop administrative systems, procedures and cultures geared to the industry as it used to be.

As a result, fast, dial-up customer applications are being held back by lumbering mainframes. And salespeople accustomed to face-to-face client contact chafe at having to interact with customers electronically. In the meantime, companies wait impatiently to see a return on their IS investment. The challenges of negotiating such a transition might lead some CIOs to fantasize about starting from ground zero.

Larry Marzullo, vice president and CIO of The Bekins Company in Glendale, Calif., has lived that fantasy. Marzullo joined Bekins three and a half years ago, hired by a team managing the hostile takeover of the company. Marzullo's boss, Bekins President Tom Epley, had been hired to sell off unprofitable divisions and streamline operations. Under the auspices of Bekins' aggressive new management, Marzullo was charged with developing strategic information systems that would reflect and support the metamorphosis of the organzation.

"At the time," Marzullo recalled, "it was determined that the absolute key to success in this industry was dominance in information systems. Virtually every strategy we have is, in some way, based on IS."

Bekins decided it needed to know what its profit margins were on every shipment and where every piece of freight and every one of its 2,000 drivers were at all times. Its customers could benefit, as well, from being able to track their cargo. "We determined what kind of individuals we needed and what kind of product lines we were going to support," Marzullo said. He received carte blanche and 100 percent management support to develop a ground-up strategic information system for the company. The Bekins management structure and IS structure were developed together, thus setting a hospitable stage for easy integration of new systems.

In keeping with new management's streamlining measures, Marzullo cut $2 million from the IS budget. Despite that cut, his IS group managed to develop 17 major administrative and customer-service applications during Marzullo's tenure. By comparison, Marzullo said of his days as the IS manager at oil concern Unocal Corp. in Los Angeles, "I could not have hoped to do one-tenth of what we've done here, and I had 10 times the budget."

Among the applications they developed were an electronic tracking system that allows Bekins to guarantee on-time delivery for many shipments; software to schedule and monitor the equipment distribution and installation Bekins handles

keep track of the cargo shipped in its high-capacity stack trains (trains of containers stacked on top of one another). Knowing exactly where shipments are will allow the company to treat each container in a 50- to 100-acre yard as a separate, easily accessible truckload. Finding specific carloads is a manual process today, according to Michael Bohlman. "We spend a lot of time trying to find pieces of equipment," he said. But Sea-Land is designing an expert system to manage terminal yards and

JAMES S. MARSTON: *trying to provide all possible modes of transport*

position stack containers so that those that are due to leave first are the most accessible. "A lot of container yards use a stack environment," Bohlman said. But stacking restricts access to containers, "and usually the one you want is on the bottom of a stack. That's expensive."

While the railroads work on this chameleon-like approach to competing in the freight transport business, other carriers are trying to become all things to all people. Large, ocean-going American President Companies Ltd., headquartered in Oakland, Calif., has acquired stack trains and built a trucking operation to supplement its international shipping operations. "All [segments of freight transport] are competitors of ours," said Senior Vice President and CIO James S. Marston. "This places special requirements on us to step up to [compete with] the best in any of these industries."

APC's extensive intelligent T-1 network allows the company to track cargo from ship to distribution center to retail store and then back to shipboard. A computer-aided logistics system helps APC identify potential bottlenecks and monitor train and vessel on-time performance. It can plan the most efficient intermodal route for a shipment and make sure the cargo stays on schedule. This massive logistics-management effort is necessary not only to attract new customers, but to keep current ones, according to Marston. "There's no such thing as an automatic customer in this business," he said.

Norfolk Southern's Norman G. Heller, an assistant vice president for marketing, shared Marston's concern about keeping customers. He added, too, that the rise of third-party logistics consultants has added to the competitive stew. According to Heller, third-party consultants sell their services on the premise that they can arrange better prices and overall service for shippers because they are

PHOTO ABOVE BY CINDY CHARLES; PHOTO LEFT BY DAVID POWERS

for its high-tech shippers; a program that calculates shipment costs and tariffs for shippers; and a module that allows Bekins' 500 regional agents to schedule and price any shipment going anywhere and send the information to headquarters. Marzullo estimated that the business constituting 97 percent of the company's revenues comes in via the agents' PC-based systems.

He credits his success to the newly lean Bekins organization. According to Marzullo, the company labored through a 75 percent turnover at the time of the takeover. New hires reflected the fast-moving work style of the takeover management team. While Marzullo admits that creating synergy in an entire department of newcomers was the biggest challenge, he said that the simultaneous reconstruction of management structures and IS has resulted in a customized fit between the two that makes such breakneck IS development possible.

Bekins' commercial freight-transport activities for the high-tech industry are among the fruits of the company's restructuring labors, and Marzullo feels sure that the company is poised for even greater endeavors. "We had a Big Eight [accounting firm] look at our competitiveness four years ago. We were way in the back of the pack in terms of capability," he said. Last year, Bekins had the same firm take another look. "We were right at the top of the industry." —*M. O'Leary*

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not tied to any particular carrier. Heller counters that carriers have a strong competitive incentive to find the quickest and least expensive routes for their customers' cargo, regardless of whose trains, trucks and boats are being used. "The consultants like to argue that they alone can be impartial," he said. But impartiality—or integrity, as Heller likes to call it—is just one more competitive necessity to add to the ever-growing list.

Although they are aware of the growing number of third-party logistics managers, freight transporters do not number consultants among their major competitive concerns. With the exception of small regional trucking companies, almost every carrier seems to be focusing instead on stretching, acquiring and maneuvering to achieve a global reach.

RON PONDER: *Shippers and carriers are increasing their interaction.*

Few carriers can boast of a tracking reach as profitable as that of Federal Express Corp. in Memphis, Tenn. FedEx's phenomenally successful package-tracking efforts have helped it become the world's largest all-cargo airline, and have made it a $5.2 billion company in just 16 years.

The company's record of success gives credibility to its plans for the future: "We intend to be the world's largest, best and first logistics company," said Senior Vice President of Information and Telecommunications Ron Ponder. FedEx's package-tracking system and its recent merger with another air-freight company, Flying Tigers, are major components of its strategy to position itself for further international growth. The company already operates in 119 countries worldwide.

Ponder sees "an increasing movement toward globalization, as well as a need to move more critical inventory parts [in a] more timely [fashion] and more cheaply." Like many carriers with manufacturing clients, FedEx is involved in distribution and warehousing for many of its customers. Integrating global package tracking with the information supplied by customers' information systems becomes more complex as a carrier grows internationally and gets more involved in a customer's business. The carrier's involvement in distribution and manufacturing broadens as carrier and customer begin to interact globally, Ponder said. Once it makes a global commitment to a customer, a carrier may find itself with an overwhelming role in manufacturing products whose parts come from the lowest-cost producers.

"You pick up your VCR, and it's made in 10 different countries and assembled in another," Ponder pointed out. The carrier's involvement in that international assembly line requires a commitment to the manufacturing company, as well as to all of the individual companies along the line. Add international distribution of the finished product to the list of functions and the carrier has a great deal of responsibility for its customers' day-to-day success. From customs to international regulatory restrictions to basic telephone communications, Ponder added, there are many more ways for goods and information to get lost or delayed.

FedEx's goal, according to Ponder, is to build an air transportation system that allows the company to move "time-sensitive" equipment anywhere in the world in two days while still taking advantage of FedEx's computerized tracking and handling systems already in place in the U.S. As with any of the competitive carrier services, the success of FedEx's globalization relies on its ability to move information about its packages.

> *"There's no such thing as an automatic customer in this business."*
>
> *—James S. Marston*

"The key from my position in the industry," agreed Summit Information Systems' Pavloff, "is that the movement of information and the communication of it is every bit as important as the physical movement of the goods we transport. You can't do one without the other anymore. The people who build on that [understanding] will be the ones who succeed." CIO

PHOTO BY JACK KENNER

For 20 years, The Research Board Inc. has studied IS issues of vital importance to major international corporations. Unlike most IS research organizations, the Board shuns publicity. Recently, however, Research Board senior partners and co-founders Naomi O. Seligman and Ernest von Simson agreed to discuss some of their recent research with CIO*—the first time Research Board findings have been publicly aired. The discussions shed light on how large companies are solving complex organizational issues and pours cold water on some current thinking about decentralization.*

A New York-based research group that helps top CIOs share data on what works and what doesn't in IS management shares some of its recent findings

INTELLIGENT NETWORKING

The Research Board Inc. is one of the IS world's most unusual institutions: part Billionaire's Club, part research house and scholarly retreat, and part for-profit consulting firm. According to Seligman, to become a client is to become a member is to join an exclusive, elite society. Membership is strictly limited to CIOs at the 80 companies considered to be "the best users of technology" in major industries, "based on their reputation for leadership in information systems." Sixty of the CIOs work for American companies; the rest are employed by European corporations. All work for businesses that take in at least $10 billion in annual revenues. Members include such prominent CIOs as American Airlines Inc.'s Max Hopper, American President Companies Ltd.'s James S. Marston, Chrysler Corp.'s G. Nichols Simonds, The Hartford Insurance Group's William L. Harrison, Kraft General Foods' J. Bruce Harreld, Merrill Lynch & Co.'s DuWayne Peterson, and Mobil Corp.'s Jerome F. Trautschold Jr.

Computer and communications vendors are kept at arm's length by the Board. Although senior executives of computer companies sometimes speak at Research Board meetings, they are not permitted to join, commission research or donate money. The Board is financed largely by membership dues; some funding comes from consulting work undertaken for

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members.

The Board's value to its members, Seligman explained, lies both in its research activities and in the opportunity to discuss IS issues with other CIOs at scheduled meetings held throughout the year at the Board's New York headquarters and elsewhere around the United States and in Europe.

Members commission three research projects a year. According to von Simson, the topics they choose tend to fall into one of three broad subject areas: best practices, which typically involve IS organizational issues; technology management studies, such as computer security or network management; and applications such as distribution-channel systems and CIM. All research is conducted by the Board's own full-time 10-member research staff. Researchers are granted access to confidential information supplied by Board members and IS vendors, according to Seligman.

The research is presented and discussed at closed-door meetings attended by 20 to 40 members. Members are expected to attend three such meetings a year. To ensure a high level of discourse at these meetings, members are required to read all Research Board reports in advance.

Member CIOs must also attend meetings in person—no stand-ins are allowed. As good as the reports may be, said von Simson, "it's the discussion with members, staff and guests that stirs it all together and makes it edible."

The research summarized in this article is based on investigations into IS organizational practices by Board members. It draws upon separate studies of data-center operations and applications-development organizations. The findings—which build upon 16 years of ongoing research on IS practices—were presented to Board members between June and December 1988. Seligman stressed that the findings apply to multibillion-dollar corporations, but not necessarily to smaller companies.

Decentralizing computer operations is a recurring theme in IS circles. According to conventional wisdom, said Seligman, companies are migrating their systems from mainframes to a three-tiered computing architecture of mainframes, minicomputers and PCs. Firms are breaking up their mainframe-dominated central data centers in favor of smaller, local minicomputer-based centers. Some IS gurus have even predicted the demise of the mainframe.

But a Research Board study indicates that the conventional wisdom and mainframe doom-sayers are wrong.

"IS decentralization is bunk," said Seligman.

A study of data-center management practices in 26 Research Board member companies found that 24 were consolidating their operations, or already had. (Von Simson defines consolidation as combining many centers into fewer, whereas centralization refers to placing centers under a central manager. Consolidation implies centralization, according to von Simson, but the reverse is not necessarily true—a company could centralize without consolidating its centers.) Even companies that had set up local centers were disbanding them, absorbing their functions into mainframe-based central data centers that are larger than the local centers combined.

"The consolidation of computer operations seems to transcend whatever business philosophy they were operating on in other areas," said von Simson. "Consumer products companies, with a very decentralized tradition, are continuing to consolidate operations."

In addition, some companies are abandoning a three-tiered architecture, eliminating minicomputers, and adopting a two-tiered architecture of mainframes and workstations.

In some cases, von Simson said, consolidation was the result of merging or acquiring another company. But in most cases, companies consolidated operations and adopted two-tiered architectures to save money and improve the performance of their operations. The companies surveyed reported, on average, an immediate 20 percent savings as a result of consolidation. Members saved even more over time from the efficiencies obtained by consolidating.

ERNEST VON SIMSON *and* **NAOMI O. SELIGMAN** *run the*

New York-based Research Board as an exclusive haven for CIOs interested in putting new theories of IS operation to some practical tests.

PHOTO BY KENT HANSON

These benefits come in several ways:

■ **Labor:** Research Board members experienced difficulty finding enough good technicians to run their local centers. The cost of paying the ever-increasing salaries demanded by top-flight operations staff became burdensome. By consolidating their centers, companies saved money and improved the quality of their staff. "As you got bigger data centers, you got better people because you could afford them," said von Simson. "That's pretty universal. The great hidden value of consolidation is a staff capable of improving reliability, efficiency and productivity."

■ **Software fees:** Rising software-licensing fees, particularly for key items such as database-management systems, pushed Board members to consolidate. By running a system on one mainframe instead of several

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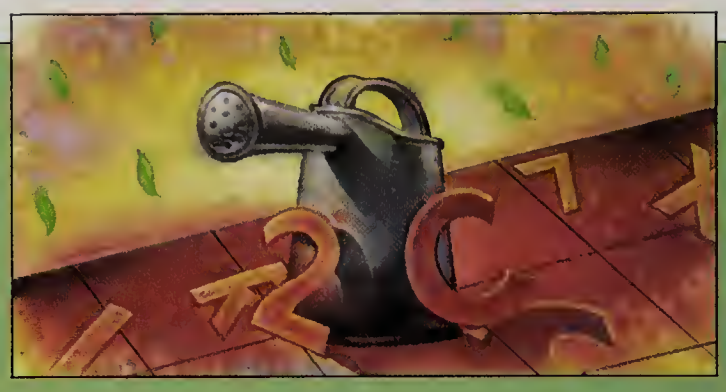
minicomputers, members dramatically and quickly cut their software expenses. Vendors are trying to adjust their fee schedules, researchers found, but not fast enough to offset the advantages of consolidation.

■ **Costs favor centralization:** Decentralization made economic sense because of the high cost of transmitting data between users and remote mainframe sites, the frequency of mainframe crashes and the limitations of dumb terminals. All of these problems have been overcome, the Board's researchers concluded.

Competition among network providers has driven down communications costs in the United States. WATS services costing 29 cents a minute in 1984 cost 16 or 17 cents in 1989, said von Simson. Returns on private lines are "unbelievable. We have members paying half as much for far more capacity."

Mainframe downtime has decreased. Members' mainframes "went from 85 to 96 percent reliability to over 99 percent. That's astounding when you translate that into hours," said von Simson. And today's inexpensive but powerful PCs can perform much of the data processing done on minicomputers and mainframes, further reducing data-transmission costs.

■ **Difficulties of decentralization:** The study cast some doubt on the flexibility and connectability of decentralized operations, according to von Simson. Departmental and tier systems are workable—some members "have done it and are happy." But others found departmental and tier systems incur unacceptably high staffing and software overhead costs. Such systems were also found to be awkward to use because of the wide dispersion of data. For example, it can be harder to retrieve massive amounts of data from several departmental systems than from a single system. This is a controversial conclusion to a complicated issue, von Simson acknowledged. Nevertheless, in an age when workers increasingly need data from other departments, storing data in many local data centers makes less sense.



Measure for Measure

Chief executives use techniques that range from the investigative to the intuitive in evaluating the work of their CIOs

How do CEOs judge whether their CIOs are successful and competent? The Research Board came up with some answers in the course of its work on IS organizations. Six CEOs discussed the subject during the course of those studies. Others have since been interviewed by Research Board co-founder and Senior Partner Ernest von Simson.

Von Simson said the most common evaluation technique is to simply ask line executives how they think IS is doing. Naomi Seligman, Research Board senior partner and co-founder, related one CEO's trick question. "[He] asks line managers, 'How is the problem with the IS organization?' If the answer is 'What problem?' then he knows IS is on track."

But increasingly, CEOs are putting more weight on other indicators. CEOs draw a clear distinction between becoming popular with users and responding to corporate objectives—and the latter comes first.

CEOs judge CIOs by how much they help the company obtain competitive advantage, and win and keep paying customers. CEOs place great store on how efficiently CIOs run their IS operations. And woe to any CIO who cannot provide some method of measuring or demonstrating success.

CEOs want to know if their companies' systems do a better job of pleasing their paying clients than the competition's. CEOs in service industries look at how their customer-support systems—such as systems for insurance agents—stack up against those of their rivals, said Seligman.

Manufacturing CEOs look for indicators that IS has helped the company become more responsive to customer requirements. A chemical-industry CEO might look to see whether IS has enabled the firm to quickly produce small batches of chemicals, Seligman said. CEOs also judge their IS organization by the feedback they receive from their customers, and by such general business indicators as market share.

Since CEOs foot the bill for IS, they judge CIOs on how efficiently they run their organizations. Are IS operations cost-competitive with the competition's? Are systems-development projects delivered on time, on budget and in working order? Has the CIO kept IS head count down and management layers to a minimum? Can the CIO provide statistics proving IS productivity is increasing—measured not by the lines of code written in a month, but by the time it takes to get a major system up and running?

CEOs want CIOs who are strategy-minded, but they look to their CIOs to be team players rather than gunslingers. As chief executives see it, said Seligman, "CIOs are part of a strategy team, *not* the strategist. IS executives are paid to be good at providing the company with the right technological opportunities. Taking advantage of technology is part of their job." But, like a CFO or any other department head, they are not paid to "act as a business generalist or set an overall business strategy." —*A.E. Alter*

ILLUSTRATION BY CARIE HENRIE

■ **Lower brick-and-mortar costs:** By consolidating data centers, Research Board members spent less not just on systems, but on security, emergency generators and backup units. And by operating fewer centers, companies can also install diagnostic and monitoring tools more quickly and at lower cost.

■ **Future savings:** As data-center automation evolves, companies expect it will be easier and less costly to automate a single large center than many smaller data centers.

Overall, researchers found, "the economies of concentration are incontrovertible—and will become even more compelling in the future," said von Simson. The arguments for a three-tiered architecture "are not as dominant as they used to be," he concluded.

CIOs wish to create more responsive, business-oriented IS organizations. But how? This question has led to endless discussions over the best way to organize IS functions, and has fueled the debate over decentralization versus centralization. The applications-development-and-support function, which creates and maintains systems used by line departments, stands at the center of this controversy. The Research Board examined how 25 of its members organize applications development in their companies. It found that most IS executives had moved applications development out of central IS.

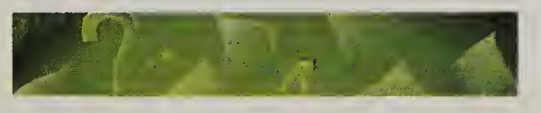
About half of the 25 companies studied dispersed at least some of their development activity. (Von Simson defines dispersion as moving the physical location of IS units away from the central IS department and into the user organization.) Six of the 25 companies not only dispersed, but divided managerial responsibility between IS and the user department in a "striped-line" reporting arrangement (defined below). Even fewer had gone further and decentralized this IS function, giving division executives managerial control.

Most of these companies had dispersed or decentralized in hopes that "user control will lead to applications more relevant to the business," and enable IS to become more responsive, the report stated. (A few companies had decentralized because the corporation itself was divided into independent business units.)

But those companies that had decentralized were not happy with the results. Decentralizing applications development did not necessarily lead to more relevant applications. According to the report, "most systems identified as impacting revenues or non-administrative costs were developed by central groups."

"Information systems decentralization is bunk."

—Naomi O. Seligman



Furthermore, decentralization was found to have many disadvantages. The effectiveness of a decentralized development group depended on the technology-management capabilities of the line manager, said von Simson. Some were good at managing technology, others were not. Decentralized development groups often suffered from "atrophy," he said. Staff members did not keep their technical skills up to date. And, according to Seligman, IS staff assigned to decentralized development units often lack a clear career path within IS.

In many companies, von Simson said, decentralization made integrating systems across departments more difficult. According to Seligman, IS executives lost the clout needed to make necessary company-wide changes, or set corporate IS standards.

Is there a way CIOs can combine the efficiencies and professionalism of centralization with the responsiveness of decentralization? The Board's senior partners believe they can provide a guidepost.

Based upon their investigations into IS organizational structures, the Board's research staff created a model for a well-balanced and effective IS organization. The model is a composite of the "best solutions" found by Board members. (Von Simson declined to identify which parts of the model come from which Board members.)

This model, von Simson noted, is not meant to be adopted in its entirety. In fact, no Board member has done so. Several functions described in the model overlap, and CIOs are advised to choose those that best fit their respective organizations.

Many corporations, according to Seligman, organize IS by dividing the department into three central functional areas: applications, operations (such as the data center and telecommunications) and planning. The Research Board's composite model breaks up the old hierarchy, creates new functions and eliminates others.

One feature of the model is dispersed applications development and support groups. Each department served by IS has its own group, located on-site. This group has what von Simson and Seligman call a "striped-line" reporting relationship to both the department or division it serves and to IS. That means IS and the line-organization share managerial responsibility for the development group. Each user-organization is responsible for setting priorities, the size of its applications group and cost ceilings. But the central IS organization calls the shots on the technology platform—setting standards on hardware, operating systems, database systems, networks, CASE and other development tools. Central IS retains responsibility for all human-resource functions: recruiting and hiring, training, transferring and promoting applications staff. The head of the group reports to the IS executive.

Making sure both the applications-development group and central IS understands and responds to user needs is the responsibility of a new member of the IS team: the account executive (AE). Each department

would have its own full-time account executive. "The AE is the person from IS who represents IS to the user," said von Simson. "The AE is a guy who knows how to get whatever resource you need." In effect, AEs would be sub-CIOs, helping their departments use technology for competitive advantage, and ensuring IS responsiveness. AEs can come from either the IS or the end-user department, but they must be among the company's "best and brightest," said Seligman.

Other IS functions described by the Board's composite model would be centralized, rather than dispersed.

IS executives have long wondered how to leapfrog the competition with innovative applications when their departments are staffed with traditional mainframe-oriented systems developers. The Board's model suggests three separate central application development groups be created, each reporting to the CIO.

Group A is charged with developing and improving mainframe applications. Group B's members are encouraged to take risks, developing applications using PCs, or microprocessor-embedded devices such as hand-held terminals. This group might also experiment with UNIX or parallel processing.

Group B consists of the company's most imaginative technicians. To make Group B viable, CEOs and CIOs must be prepared to accept a 25 percent failure rate on Group B projects. Group B members should be separated from Group A—perhaps by hundreds of miles. According to von Simson, not only Board members but computer firms such as IBM get the best results by keeping the more "fragile, risky efforts" of such innovators free from the interference of mainframe technologists.

A third group—the Applications Integration Group (AIG)—integrates the efforts of groups A and B with the company's existing systems. "This is an overall coordinative function," von Simson said, and also requires highly imaginative IS staffers. Their job is to consider how to tie together various computer operations, applications and technologies, create an overall plan for developing the application, and contract out and coordinate the development effort among the various IS groups.

"The economies of concentration are incontrovertible, and will become even more compelling in the future. [The arguments for a three-tiered architecture] are not as dominant as they used to be."

—Ernest von Simson

A fourth central IS group, the Systems Support Group (SSG), provides technical support and assistance to the three applications development groups. The SSG supports databases, software and minicomputers, and provides standard development tools and training. This group's standard-setting function ensures lateral career mobility for all IS staff. No IS members would be stuck in a particular end-user department because they did not know the development tools used elsewhere. And by establishing corporate standards, the SSG ensures that applications can be integrated across departments.

Two other central IS functions—data-center operations and telecommunications—would constitute separate IS groups. The former would run the consolidated data centers discussed in the first study, while the latter would be in charge of telephony and voice technology.

Despite the increasing integration of voice and data, these two organizations should be kept separate. The two functions require different organizational cultures. Operations staff is paid for reliability and cutting costs, not for taking risks with new technologies, said von Simson. "Telecommunications is becoming an experimental area, with totally new responsibilities, applications, technologies and vendors. It's a very complicated world, messy and opportunistic." Successful telecommunications organizations differ from those that "are just trying to keep things going every day."

What is missing from this model? Planning groups, for one. Account executives and line management would take on the planning role. "That's how IS gets responsive," said Seligman.

The model also doesn't include a separate R&D group—in part, Seligman explained, because R&D groups have a reputation in many companies for undertaking frivolous work. More importantly, R&D's function has been usurped in the model by the applications-development organizations. Board members with effective R&D units, said von Simson, make sure they "deliver technology, and not just study it."

According to Seligman, not only would line organizations benefit from this model, but so would IS personnel. The Board's model creates a rewarding career path. Since IS staffers are not locked into any one group, they can broaden their skills and increase their knowledge of their company's business by rotating among departments. Should any one department be downsized, IS staff can be moved to another division, rather than laid off.

CIOs who follow the tried-and-true best practices of the Board's members will also reap personal benefits, according to Seligman. CIOs who build responsive IS organizations can devote time to working with other key executives on strategic matters. In Seligman's phrase, they can gain "parity of influence" with other key senior executives. CIOs who run responsive, well organized IS departments are like owners of well-maintained cars: Instead of tinkering under the hood like a mechanic, they can concentrate on the road ahead. CIO

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PUTTING HERTZ EXECUTIVES IN THE DRIVER'S SEAT

In an industry defined by cutthroat competition and fast-shifting opportunities, an EIS can put decision-making on a real-time footing

Hertz's car-renting competitors might be interested to discover that they're not the only ones who try harder. As the number one car-rental company in the nation, The Hertz Corp., located in Park Ridge, N.J., dominates an intensely competitive industry where a marketing plan is more likely to depend on the weather than the economy. The ability to sift through electronically gathered information about cities, climates, holidays, business cycles, tourist activity, past promotions and market forecasts allows a company to make the almost instantaneous marketing decisions that have become a requirement for playing the game.

BY MEGHAN O'LEARY

SCOTT H. MEADOW *(behind the wheel)* *and* **WILLIAM J. CARROLL**

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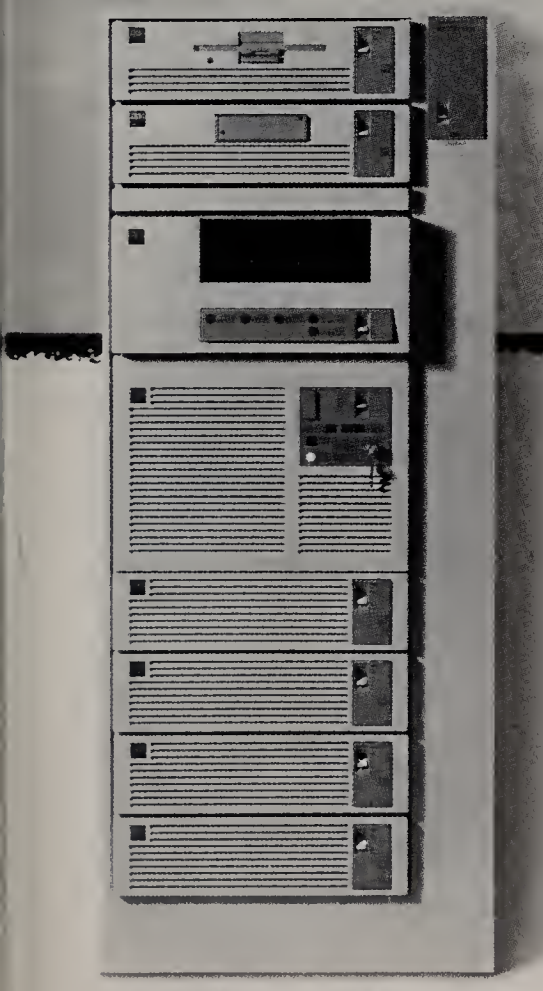

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In order to maintain its lead on the competition, Hertz's marketing department has implemented a mainframe-based decision support system (DSS) and an executive information system (EIS)—a PC-based front end to the DSS that gives executives the tools to analyze the mountains of demographic data and make real-time marketing decisions.

The system's information reach extends to Hertz's nationwide network of rental locations and culminates at the company's executive offices in Park Ridge, where its creators, Staff Vice President of Marketing Planning William J. Carroll and Director of Marketing Services and Pricing Systems Scott H. Meadow, oversee its operation.

Hertz's EIS began somewhat unexpectedly three years ago as Carroll was interviewing Meadow for the position he now holds. When Carroll had finished asking questions, Meadow had one of his own. He wanted to know what Carroll wanted in a computer system. Carroll's answer, and his subsequent hiring of Meadow, resulted in the DSS (built around System W from Comshare Inc., of Ann Arbor, Mich.) that formed the backbone of the EIS (Comshare's Commander EIS was added in 1988).

"We knew we had a need [for an EIS]. It wasn't an apparition in St. Patrick's Cathedral."

—William J. Carroll

With the EIS, Meadow and Carroll gave their DSS a front end in the form of tools that executives could use to analyze and extrapolate on valuable sales and marketing information from across the country. This includes not just information from Hertz's own rental agreements, accounting departments and fleet purchases, but computer-reservation-system reports on how many calls are made to Hertz's 800 number and airport reports on comparative revenues for the various car-rental companies stationed there.

The major force behind the company's EIS—besides the energy and vision of Meadow and Carroll—was the clear need for more information, better information and immediate information. There was no army of technology-resistant executives to convince, because Hertz executives understood the mercurial and demanding nature of their industry as well as Meadow and Carroll did. Their understanding of the competitive value of information opened their minds to any tool that would make it easier to get information and interpret it.

The car-rental industry is a deadly competitive one, according to Carroll. "You have four or five major firms vying for major market share." Car-rental prices have risen little over the past decade, forcing companies to cut costs and increase sales to maintain healthy profit margins. "It's an easy business to enter, but a difficult business in which to grow and become successful," he said.

As a result, according to Meadow, the decision-making processes at a company such as Hertz are marketing-oriented and based on future expectations rather than known quantities. For instance, a manager may decide to lower prices and add cars in Florida during March in hopes of attracting vacationers at the height of the season. Another may discount weekly rates during the holidays in order to win over some of the plane-

Company founders **JOHN HERTZ** *(left) and* **WALTER JACOBS.** *In background is a 1920s rental depot.*

PHOTOS COURTESY OF THE HERTZ CORP.

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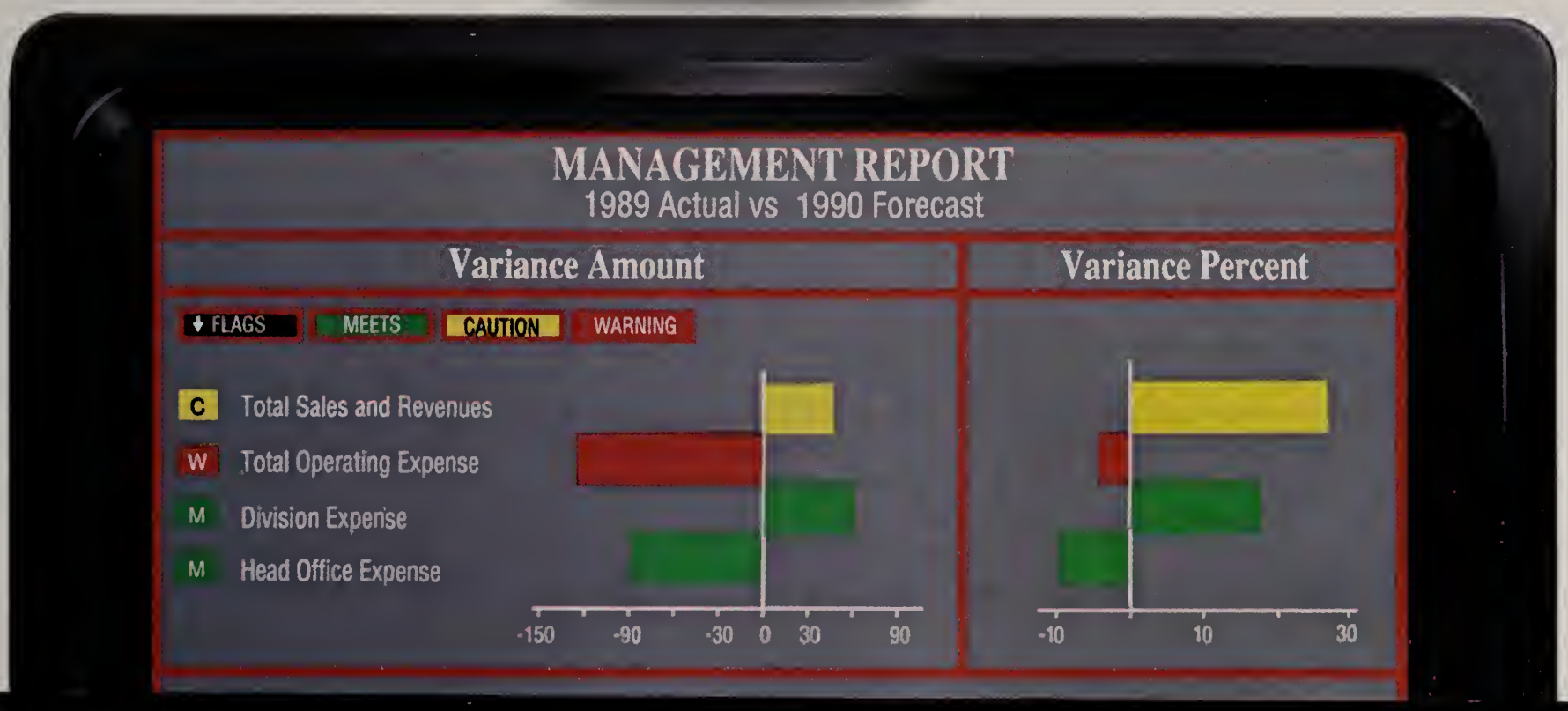
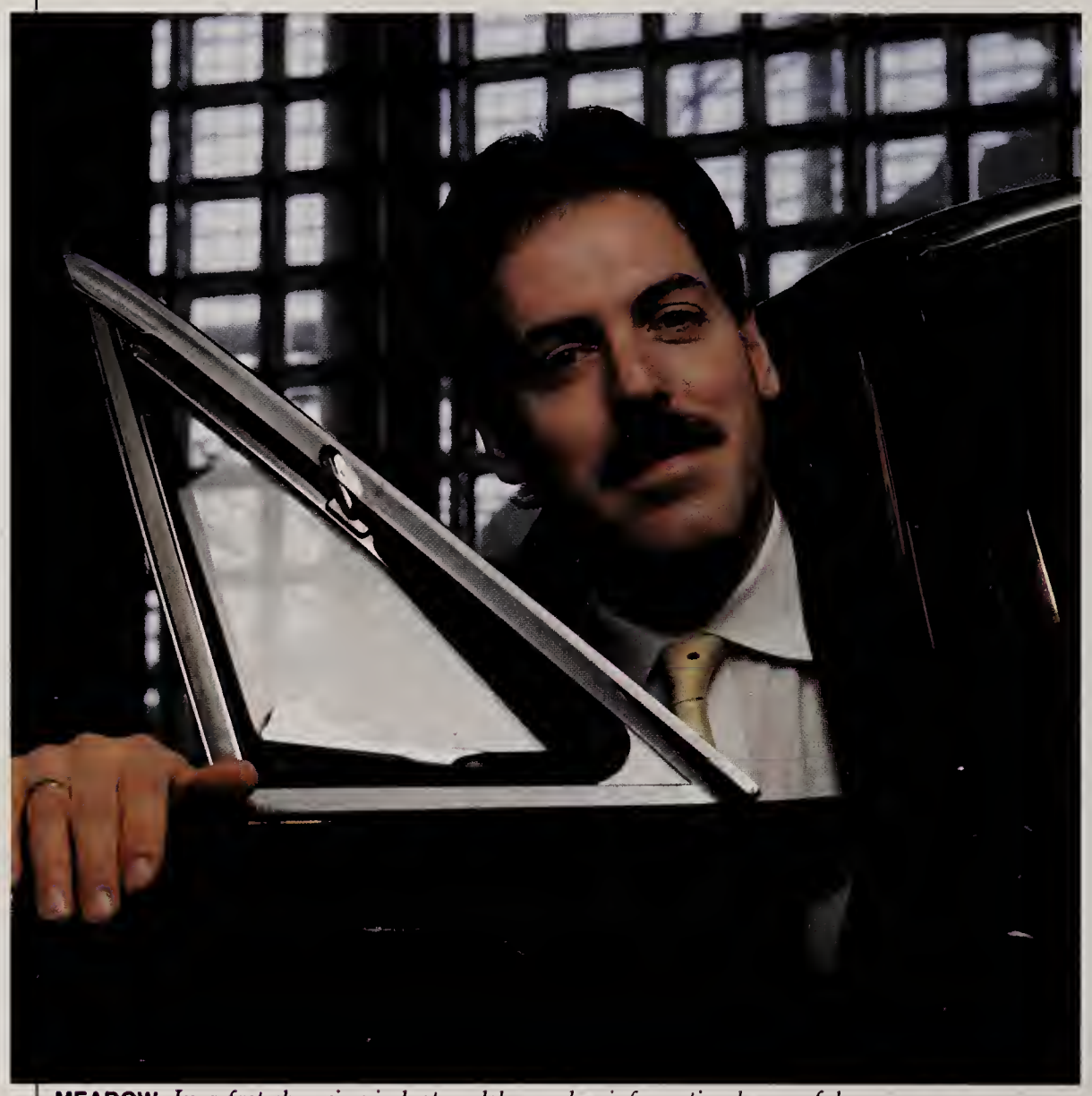
* "Decision Support and Executive Information Systems: Markets and Trends," International Data Corporation, November 1988.



and train-boarding crowd. Whatever the marketing ploy, the expectations are based on analysis of past market behavior, seasonal and regional business highs and lows, and the success or failure of past promotions. And no matter how painstaking the market analysis or how complete the market history, consumer behavior is hard to predict.

"We knew we had a need," Carroll said. "It wasn't an apparition in St. Patrick's Cathedral."



MEADOW: *In a fast-changing industry, delay makes information less useful.*

As a result of filling that need, Carroll has masses of marketing and rental information at his fingertips. But you wouldn't know it from his Spartan, nearly paperless office. "Look around," he said to a recent visitor, gesturing to the uncluttered workspace, "I didn't just empty it out before you got here."

The absence of paper is evidence of the EIS's streamlining effect, which allows Hertz executives to make marketing decisions based on their immediate observations of the dynamic car-rental market. "Timing is critical," said Meadow. "We were able to [analyze information] before, but when [a marketing executive] asked a question, he had to go to a systems analyst, tell him what he wanted," and then wait for the result. Now marketing executives can answer their own questions and plug in their own variables.

"Decisions are going to be made whether you have information or not," Meadow continued, and they're going to be made at the company's convenience. "A CEO . . . can't wait for information. [Waiting] makes it useless information."

By allowing Hertz to keep track of and respond to current market conditions, the system also allows the company to take into account the possibility of certain conditions occurring again. This ability is at the heart of the company's yield-management system, whereby it may choose to offer special rates or unlimited mileage in order to boost sales in slow times and keep rates steady at times when demand has been high in the past. While these kinds of decisions were possible in the past, executives had to wait days or weeks for paper reports from MIS. According to Carroll, "The system gives you the opportunity to accumulate information about [possible] future trends [and] to take some of the risk out of those decisions."

> *"A tool like this begins to create a synergy in decision-making. It triggers questions, a greater influx of creative ideas, and more effective marketing and cost decisions."*
>
> —*Scott H. Meadow*

Despite the obvious importance of a marketing-oriented system in a marketing-oriented company, Meadow emphasized that cooperation between marketing and IS was essential to the project. The IS department was concerned at first that the host-based DSS might overload their mainframe enough to slow down other non-marketing applications. The EIS portion of the system concerned IS less because it was PC-based. (Meadow contends, in fact, that off-loading data analysis to PCs "benefited the mainframe side.")

To the IS department's credit, it tempered its concern about resources with a clear understanding of Hertz's business objectives. "The absolute need to have the kind of infor-

PHOTOS BY PETER VIDOR

mation that we could get with the EIS and the DSS associated with it was . . . [so] overwhelming . . . that everybody in MIS kind of rallied around the banner," Meadow said. Not only did marketing get its system, but it maintains it with a smaller technical team than was originally planned, according to Meadow.

Hertz's EIS stands out as much for its modesty as for its excellence. Despite the unquestionable benefits of their system, Carroll and Meadow don't push the EIS's technology as much as they push its output. Although every Hertz executive uses the system in one form or another, according to Meadow, they're not all hands-on users. In the executive suites, some managers access the EIS through personal computers on their desks. Others, who may not need or want a computer, choose to rely on paper reports generated by the system. One of the better-known examples of this is Hertz's chairman, Frank A. Olson, who prefers paper printouts of EIS-generated reports to a high-tech interface.

"Frankly, at this point, a chairman can be provided the information without having the system on his desk," Meadow said. "He [still] has access to better information more quickly than before." Form takes a back seat to function in this case.

This conservative approach in no way stunts the system's growth, Carroll and Meadow agreed. "The system becomes [more widely] available because it's needed," Carroll said.

"We're constantly enhancing it," said Meadow, adding that the system's assimilation into the corporate culture is intuitive because it conforms to the way Hertz executives work. "People find new applications and suggest them. Without adding more software or people, you can leverage [the EIS] with a small change or adjustment."

Carroll and Meadow are quick to point out that the number of people using an EIS isn't the sole measure of the system's success. As to what is an accurate measure for Hertz of the system's success—"That's a tough question to answer," Carroll replied. "We can't say 'It was this sum of revenue, or that market share we captured.' It's hard to quantify in terms of dollars and cents, but we're doing better than our competitors."

CARROLL: *The system is used because it's needed, not because it's slick technology.*

The reason for this, and the real measure of the system's success, according to the two men, is that the EIS allows Hertz to use its information and IS resources better. Executives can manipulate and refine data to be more meaningful and strategically significant to them. In addition, "our [mainframe] programming resources can be routed to other projects," Meadow said. "With powerful PCs, you can offload analysis and ad hoc stuff that would normally eat a mainframe alive." Hertz's EIS allows executives to draw in the mainframe's information resources, store the needed data on their PCs, and analyze and what-if to their hearts' content without tying up valuable mainframe time.

As a result, Hertz's EIS has a conserving, streamlining effect, triggering a kind of creative growth among executives, according to its creators. Meadow pointed out that EISs are often described purely in terms of critical success factors—the types of information they must provide in order to fill the executives' needs. But Meadow contends that an EIS has an elusive creative effect that is quite apart from the specific pieces of information it provides.

"A tool like this begins to create a synergy in decision-making," he said. "It triggers questions, a greater influx of creative ideas, and more effective marketing and cost decisions." The fact that the car-rental industry relies on successful marketing decisions makes a company such as Hertz particularly conducive to this kind of synergy, he added. According to Meadow, the decision to use an EIS does not guarantee success. The key, in Hertz's experience, is "how you use it." CIO

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Return of the Prodigal Fax

Advances in PC and network fax boards could land the technology back in the IS group

BY ROBERT ROSENBERG

It is hard to remember an office device that has exploded onto the scene quite like the facsimile machine. From a niche-market position in the 1970s to the indispensable office device of the 1980s, technology and mass marketing have transformed the fax machine from an obscure, expensive and slow image-transmission system, stuck away in a corporate data center, to a desktop commodity product that is within reach of even the smallest business enterprise.

But fax is about to undergo another metamorphosis, and the changes are likely to land the technology right back in the lap of corporate data-center management. PC fax boards—an important growth segment in the fax market—are finding their way into local area network (LAN) servers, creating fax functionality in a networked environment. These fax server boards (as distinct from stand-alone PC add-on boards) have just started to hit the marketplace, and are priced in the $1,500 to $2,000 range. When linked via the sorts of carrier services now being offered by US Fax Inc. of Philadelphia, and MCI Telecommunications Corp. of Washington, D.C., the new fax begs for the kind of specialized management that corporate data centers are best equipped to offer.

Fax boards—as add-on cards for stand-alone PCs—are a growing segment of the fax industry. Since they were introduced about three years ago, some 100,000 units have been sold. Next year, The Eastern Management Group expects the number of fax boards will more than double as end-user prices drop about 20 percent below today's $200 to $500 price range. By 1994, the installed base of fax boards is expected to reach nearly a million units while prices fall to about $200 apiece.

PC fax boards typically combine a 4,800- or 9,600-bit-per-second (bps) fax modem with the firmware for converting ASCII files, screen input and graphics files into bit-mapped images. The board's processor compresses the bit map and converts the digitized image into standard fax format for transmission. Images transmitted via fax board can be displayed on-screen, printed out, saved in a PC file or all three.

Almost all fax boards come with the software necessary to perform basic functions: fax file management, telephone-number storage and conversion of non-fax files into fax format. Every board maker provides a program to turn ASCII text files into fax images for transmission.

A number of vendors go further, however. Many offer packages that convert files formatted for a basic Epson printer into fax formats that include various type sizes and fonts as well as forms-control characters. Some offer software that converts fax files into graphics formats. Depending on the vendor, acceptable

ILLUSTRATION BY KAREN WATSON

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formats may include those generated by popular PC graphics programs such as PC-Paintbrush (Z-Soft Corp. of Marietta, Ga.), and Dr. Halo (Media Cybernetics Inc. of Silver Spring, Md.), as well as by CAD/CAM (computer-aided design/manufacturing) software.

The most sophisticated and expensive software packages employ optical-character-recognition technology to convert fax files into text files, which can be edited and manipulated like any other PC file. A significant advance in remote desktop publishing has been the ability of fax boards to convert PostScript (Adobe Systems Inc. of Mountain View, Calif.) page-description-language files into fax files. This makes it possible to create text-and-graphics documents on a PC or Mac—perhaps by combining text and graphics received from other sources—and store them or fax them to numerous locations, if desired.

When linked via dedicated carrier services, the new fax technology begs for the kind of specialized management that corporate data centers are best equipped to offer.

The commodity nature of the PC fax board, however, as well as fierce marketplace competition are forcing manufacturers to continuously upgrade their products. PC-based voice messaging is appearing on some multifunction boards, but the most popular addition to PC fax boards is a Hayes-compatible 1,200-to-2,400-bps modem.

Most PC fax boards will swap binary file data with another board of the same manufacturer, since they share a proprietary protocol, but not with fax boards of other vendors. Adding a separate data modem to a fax board means that users can exchange binary files with almost anyone, though not necessarily at 9,600 bps. Currently priced in the $900 range, these fax/data-modem hybrids should fall to between $600 and $700 within the next year or so, once cheaper chip sets (probably from overseas) become available.

The ability to transfer binary files at 9,600 bps will increasingly place fax boards in direct competition with high-speed modem boards, which currently start at $795. Intel Corp. of Beaverton, Ore., the microprocessor maker and a recent entrant to the fax board market, and Digital Communications Associates Inc. of Alpharetta, Ga., a leading supplier of PC add-on boards, have jointly proposed a standard called Communicating Applications Specification (CAS) that would give fax boards the ability to exchange binary data files at speeds up to 9,600 bps as well as solve the multivendor incompatibility problem in binary file transfer.

Widespread acceptance of CAS

Future Fax

Until ISDN becomes widespread, Group 4 fax is a costly solution with only specialized applications

Since the 1893 World's Fair debut of Elisha Gray's "Telautograph" (a precursor to the modern fax machine that used an electronically controlled pen to produce facsimile documents at the receiving end), telecommunications image-transmission systems have come a long way. Faxing a 10-page document could take upwards of one hour using an early analog fax machine (Group 1). In the 1970s, Group 2 analog fax devices cut the page transmission time to about two to three minutes per page. Group 3 fax transmits a page in between nine and 40 seconds. The explosive growth of Group 3 is based, in part, on the standardization of the technology made possible by the work of the Consultative Committee for International Telephony and Telegraphy (CCITT), the international standards-setting organization based in Zurich, Switzerland.

The CCITT is now developing the standards needed for the next generation of fax technology, which is based upon high-speed digital links rather than analog voice lines. Group 4 fax, designed for end-to-end digital transmission, can send at 56K or 64K bits per second (bps), depending on the link's capabilities; this means being able to fax a page in just 3-5 seconds, a rate of 10 to 15 pages per minute.

In almost any application, the

cost-benefits of Group 4 fax would be substantial if these devices could use the public switched network. Until ISDN arrives, they cannot. ISDN (short for Integrated Services Digital Network) is the CCITT's master plan for transforming today's analog network into a digital network. At the moment, Group 4 is primarily used for sending fax over public packet-data networks connecting elements of private wide-area networks. Ultimately, however, ISDN will provide affordable high-speed digital service on a dial-up basis.

The chief drawback of Group 4 devices currently is cost. Unit prices start at $8,000, and the average is closer to $12,000, with some as high as $15,000. In any case, they are several times more expensive than Group 3 faxes. Typically, they are large console models weighing some 200 pounds, several times heavier than Group 3 units.

Steep prices for equipment and leased private lines mean that sophisticated units like these are, at present, practical only for a narrow range of uses. To justify the investment, several hundred pages must be transmitted daily. Group 4 fax is primarily found in situations where high-volume, high-resolution and perhaps high-security are essential—i.e., among government and military agencies.

Among corporate users, Group 4 faxes are usually part of the information-management operation within existing digital networks. Users are looking to move documents (or great numbers of documents) more quickly, or simply to optimize the value of expensive private data networks. Some companies use a few Group 4 devices in the backbones of their private networks to "fast forward" fax traffic from Group 3-equipped sites into the high-speed world.

Despite the falling cost of bandwidth generally, Group 4 devices will not have a major impact on the market until ISDN becomes an established presence three to four years from now. ISDN will make sending 64K-bps fax as easy and convenient as making a phone call.

Fax vendors recognize the inherent possibilities of ISDN, but differ in their timetables. Many leading vendors already produce digital-link faxes. Others are hesitating, expecting to wait for the wide availability of ISDN service. Agreement among manufacturers is general, however, that dial-up digital transmission service should dramatically expand the utility of fax for a host of commercial purposes. Fax should thrive in an environment of low-cost, easily-accessible digital transmission.

—R. Rosenberg

could give the PC fax board market a boost not unlike that given the fax market generally by acceptance of CCITT Group 3 standards in the 1980s (see related story). Once fax boards can function as widely compatible data modems, there will be a new market focus away from fax to multifunction boards. If this becomes a reality within the next year or two, fax boards could be outselling 9,600-bps modems by 1992.

When a PC fax board is used in a network, it greatly expands the fax's utility. A fax on a LAN can perform a range of functions that would otherwise require additional hardware. For example, a PC outfitted with a fax board and configured as a fax server can route incoming image traffic to a local graphics or character printer, or it can store and forward images acting as a gateway to other fax machines.

Most fax servers can be programmed to handle advanced call-scheduling or to broadcast an image to multiple locations. Putting sophisticated document distribution functions under program control means that transmission can take place at night when transmission costs are at their lowest.

Fax servers can also be used as automated relay points in a company-wide fax network. A remote server can accept a message from a central source, for example, and broadcast it automatically to an established list of recipients in the area. This type of

Once fax boards can function as widely compatible data modems, there will be a shift from fax to multifunction boards. If this occurs within the next year or two, fax boards could outsell 9,600-bps modems by 1992.

arrangement saves on long-distance charges. In a pyramid configuration, a central source can broadcast long-distance to regional fax systems, which can, in turn, relay the transmission to a number of locations in the area, reducing the number of long-distance calls necessary.

The same configuration efficiently supports the flow of fax information from the bottom to the top of the pyramid through polling. Polling allows a regional fax system to query other fax systems if they have documents or files to send, which can then be relayed to a central source for collection and processing.

As a counterpart to automated broadcasting functions, most fax boards provide users with log reports that let them monitor the progress of scheduled transmission attempts. A log may include inbound as well as outbound traffic, source phone numbers, length of calls, and perhaps callers' identifications as well. The

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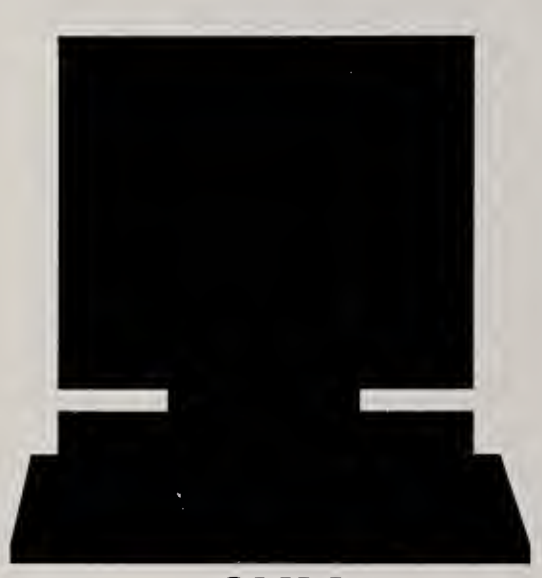

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SOURCE: THE EASTERN MANAGEMENT GROUP

log should provide a record that distinguishes among common reasons for failures—such as busy, no answer or loss of carrier.

Integrating fax servers and systems into a private wide-area network (WAN) can greatly reduce image transmission costs since fax traffic enjoys a "free ride" on any excess network bandwidth. Companies without private WANs can get comparable transmission savings using the specialized fax transmission schemes being offered by MCI and US Fax. These networks offer special network services which lower fax transmission costs.

Late last year, MCI announced it was creating the first dedicated fax network by allocating bandwidth for that purpose on its long-distance networks. MCI Fax service lets subscribers fax directly from PCs, electronic mail systems and telex machines. Using MCI's fiber-optic network, the service will assure high-quality, high-speed transmission over dial-up lines.

Customers should be able to save money because MCI Fax calls will be billed in smaller increments than ordinary telephone calls: Billing will be based on an initial 30-second increment, and then on six-second increments (ordinary long-distance calls are billed in one-minute increments). Given the speed of today's digital faxes, this might offer significant savings for regular users of fax, and certainly will for high-volume users. Discount services and WATS are billed for sub-minute interconnect after the first minute.

Packet-switched data networks (PDNs) also offer fax transmission services. In the past, PDNs tended to be too costly for fax, since PDNs charge on a packet-volume basis. Faxing an image requires much more digital data than sending a comparable message in ASCII characters, for example. But US Fax offers nationwide packet-switched fax transmission at what it claims to be dramatically reduced costs, compared with ordinary long-distance services.

The key difference is that the US Fax network (Faxsys) charges a flat $120 annual membership fee and $0.60 per minute of connection time; no charges are levied based upon packet flow. Instead of dialing a long-distance number to fax a document, users dial a local network US Faxsys number, and the network does the rest.

Late last year, MCI announced it was creating the first dedicated fax network by allocating bandwidth for that purpose on its long-distance networks.

Analysis by The Eastern Management Group suggests that other carriers will join the fax network business. Fax calls accounted for more than $3 billion in carrier revenues last year. By 1992, the entire fax bill could exceed $9 billion, which should make it appealing to AT&T, US Sprint and the Regional Bell Operating Companies. As fax traffic volumes increase and couple with LANs, the expertise required to stay on top of the technology and carriers will put fax back in the lap of data center management. CIO

Robert Rosenberg is research director at The Eastern Management Group, a market-research firm based in Parsippany, N.J.

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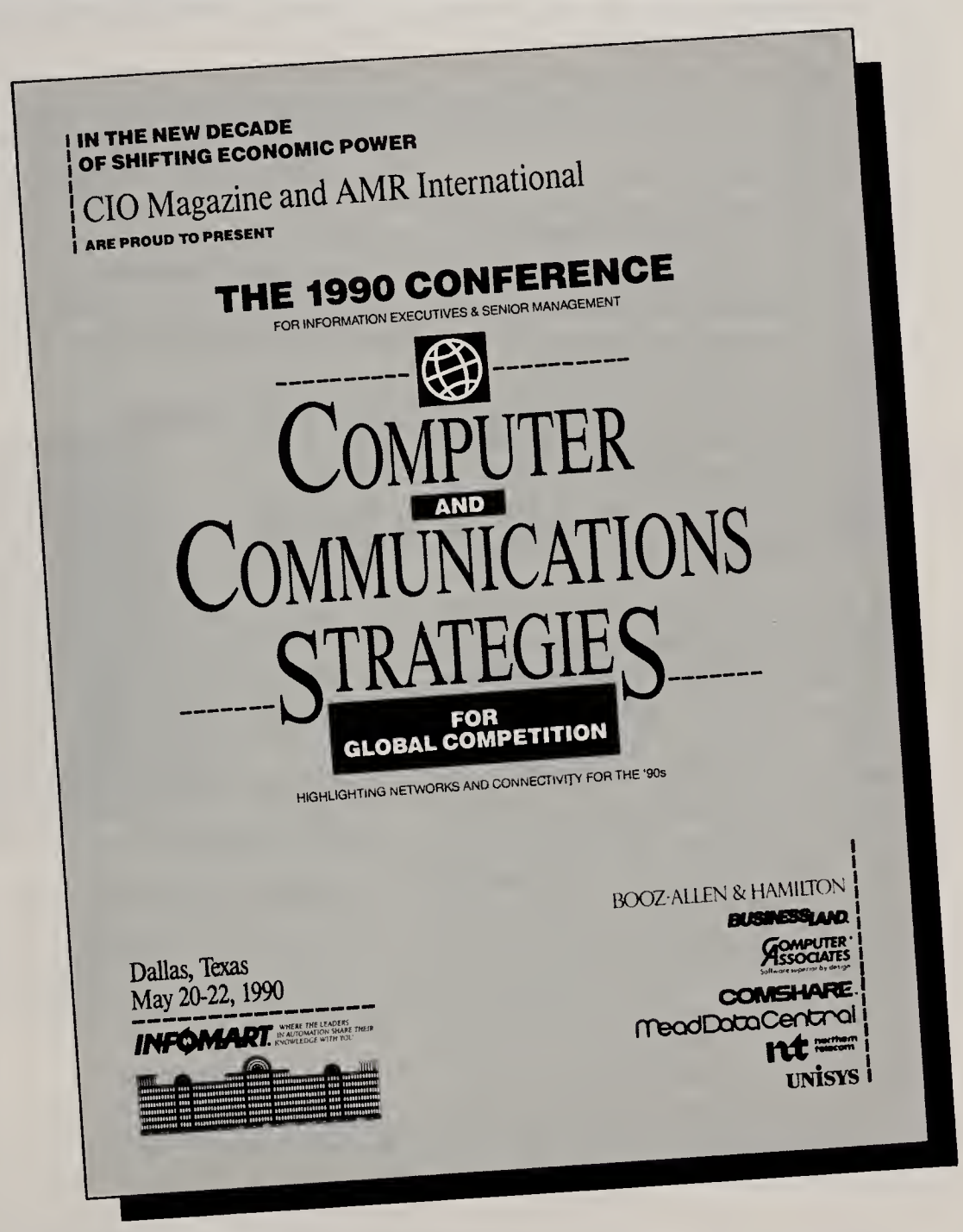

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the future it will be even easier and cheaper to search for information and store it. As personal computers and local area networks proliferate across organizations in the hands of non-systems personnel, people will propagate uncontrolled databases (on personal hard disks and file servers), and the number of people accessing networks will increase.

Add to this the growing use of artificial intelligence. As more decision rules are automated in expert systems, perceptions of these problems may be amplified as mistakes are inexorably carried to their logical conclusion in a documented form.

Taken together, these technological trends lead to applications and situations which could trigger incidents that create perceptions of unacceptable intrusiveness.

The technological forces operate in a large vacuum regarding right and wrong. Situations have been created where the rules of behavior that worked well in earlier decades do not offer meaningful guidance. We are confronting a new set of policy decisions. While it is true that individuals and organizations may be inappropriately harmed by certain applications and activities, the degree of the impact is uneven. In some settings, practices can be deeply damaging, but others lie in the category of "merely inconvenient." Some inconvenient results of increased information gathering—such as mailbox clutter—are acceptable as the "cost of progress," but society will eventually draw a line to protect against other applications perceived as more damaging.

For example, tenant-screening services, which allow landlords to exchange information about problems with former tenants, can lead to the unjust refusal of an individual's rental application if incorrect information is in the database or if mistaken identification occurs. (Some of the examples used in this article are adapted from *The Privacy Journal,* an independent monthly newsletter based in Washington, D.C.) But, more often than not, such services protect landlords from losses incurred in renting to tenants who have already proven to be bad risks, and they thereby facilitate lower rents. Will society demand that such screening services be restrained?

CIOs must think through these potential privacy problems in advance and take action to avoid negative public opinion and extreme legislative responses to inflammatory charges. Good planning can minimize the cost of adaptation to new rules. Critical questions for the CIO include:

Storage of information. Is there any information in the organization's files that should not be there? If it were brought to light that such information was being collected and stored, would there be a public backlash? Several insurance firms have recently struggled with this issue as it applies to AIDS test results, and where and how this information should be disseminated. Some advocates became outraged when they learned that individuals' files contained notations about positive test results. Lawsuits and numerous pieces of legislation (mostly at a state level) followed quickly.

Unless proactive steps are taken, CIOs will confront a public-opinion backlash against various computerized processes and a tightened legal environment with additional governmental control.

Use of information. Is information being used for the purposes which individuals believed it was being collected to serve? Individuals often provide information for what they believe is one purpose, and become upset if they find it has been used for a different purpose. For example, a credit-card issuer came under legal scrutiny when it installed a computer system that could evaluate cardholders' purchasing histories and target specific advertising in their monthly envelopes. In another example, a car dealership installed a computer system that allowed customers to answer psychological questions. The computer printed a "recommended car profile" for the customer. However, it also printed—in a back room—a suggested sales strategy for the salesperson based on the customer's answers. Had customers known about this back-room printer, they might have taken offense.

Sharing of information. Are pieces of information about individuals being electronically shared with other organizations? If so, would individuals approve of this sharing if they knew about it? Certainly, extraordinary opportunities for gaining strategic advantage have come through such sharing activities (micromarketing strategies). However, some individuals object when a company with which they do business sells their names and addresses, purchasing histories and other demographic details to other companies. If the shared information is highly sensitive—if, for example, it concerns individuals' medical or financial histories—the reaction to having it shared is dramatically exacerbated.

Human judgment. Are decisions that require human judgment being made within appropriate processes? Individuals legitimately become upset and request governmental protection when they feel that decisions requiring human judgment are being made without it. For example, an insurance company's decisions on whether to favorably process new applications—made within prescribed formulas and without human involvement—caused considerable difficulties when blindly applied in extraordinary situations that had not been contemplated when the rules were formulated.

Combining information. Are pieces of personal information from different sources combined into larger files? The concerns of individuals and law-

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makers are heightened when disparate pieces of information—even if innocuous in themselves—are pulled together. The possibility of creating a single profile of an individual's life is, to many, a threatening proposition. The entrepreneur in our earlier credit example would face this perception as he provides "one stop shopping" for several types of information through one vehicle.

Error detection and correction. Are appropriate procedures for preventing and correcting errors in place? At issue are both deliberate and inadvertent errors. Deliberate errors, which include unauthorized intrusions into databases, are often subject to audit controls. Inadvertent errors, on the other hand, are much more subtle and stubborn. They include misclassifications, data-entry errors and the sorts of errors that arise when information is not updated as circumstances change in the lives of its subjects. It is impossible to achieve 100 percent error-free operation, but observers may reasonably ask whether the trade-offs regarding the level of protection are reasonable ones. If your organization were examined by lawmakers or consumer advocates, would you appear to have decided upon the trade-offs correctly?

An example from the public sector centers on the National Crime Information Center, a nationwide computer system that is linked to many state criminal-justice information systems. Outstanding warrants, parole violations and other criminal data are often entered into local systems and are later "uploaded" to the national system (see "The Beach Is Back," Page 22). Law-enforcement agencies then query the system to see if individuals are wanted in other areas. Unfortunately, for a long period of time, problems with inaccurate data and mistaken identities abounded. These problems led to improper arrests and incarcerations, and a number of lawsuits were filed.

An audit of the questions enumerated above often reveals several items for action in the organization. Additional issues to be considered by CIOs include the following:

Long term versus short term. Line management should carefully think through each new use of information before it is embraced. In some cases, a "quick hit" for short-term profitability can yield disastrous results later. For example, an insurance company sold a list of its policyholders to a direct-marketing firm, earning a healthy fee. However, many of the policyholders were able to figure out (because of unique spellings of their names and other peculiarities) the source of the mailing list. After receiving an avalanche of mail complaining about this use of their names and addresses, as well as a non-trivial number of policy cancellations, the insurance company CEO vowed never again. The short-term gain was not worth the long-term fallout.

Line management should carefully think through each new use of information before it is embraced. In some cases, a "quick hit" for short-term profitability can yield disastrous consequences later.

Education. Problems can be avoided through appropriate initiatives. An organization's clients (customers or other individuals about whom information is stored) should be informed regarding the corporation's use of information about them when it strays from the narrow purposes for which it was originally collected. They should be told of (1) the type of information about them that is permanently stored in the corporation's files, (2) what is done with the information they provide, and (3) whether additional information from external sources is added to their files. This education process can take place in several forums—for example, through inserts into monthly statements, special letters and press releases. Corporations in particularly sensitive industries might provide toll-free telephone lines for clients' questions about information use.

Organizational mechanism. In both an initial audit and on a continuing basis, the internal and external uses and distribution of data should be given close scrutiny—especially if the firm is in situations where such data sharing is likely to occur (such as consumer marketing and financial services). In very sensitive situations, a "Data Distribution Committee" provides a stable forum for evaluating these issues. Such a committee should have high visibility and comprise senior executives. It could also be augmented by outside advisers (as is often done with corporate directors) to ensure that objective viewpoints are provided and that problems are approached with sufficient breadth.

As laws and public opinion change in the next decade, it will be necessary to check current and planned applications against evolving policies and attitudes. Are data files organized in ways that facilitate these ad hoc evaluations? For example, one might be called upon to list all data elements that are either exchanged between internal organizational entities or with external entities. Could this list be constructed in a quick and credible way?

This list of issues hints at some of the complexities that are growing up around IT use. CIOs and other members of senior management should brace themselves for intense scrutiny of their activities by both legislators and privacy advocates. There will be more focus in the 1990s on commercial information-technology activities than on governmental ones. The constant tension between the effective functioning of commerce and the individual's right to privacy will become more pronounced. It is better for the business community to take a voluntary, proactive stance now, rather than adopt a reactive posture later. CIO

F. Warren McFarlan is a professor at the Harvard School of Business Management in Cambridge, Mass.

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EVENTS

Bank Imaging Through the 1990s

Hotel Sofitel, Miami
February 26-28
Image Systems Technology Inc.
312 923-4700

This seminar focuses on real world applications of imaging for bankers in transaction and remittance processing areas. Topics discussed include identifying imaging issues and evaluating image technology. There are three workshop case studies focusing on developing and implementing imaging plans. Registration fees: $595 in advance; $695 on-site.

INTERFACE '90 Plus

Dallas Convention Center, Dallas
March 6-8
The Interface Group Inc.
617 449-6600

This computer and communications exposition and conference features manufacturers and distributors of PCs, LANs, and communications systems for voice and data transmission. The conferences emphasize information processing, LANs, ISDN, system integration, network planning and more. Registration fees: $395 for full conference and exhibits; $205 for one day and exhibits; $45 for exhibits only.

Computer Virus Clinic

World Trade Center, New York
March 14 & 15
Data Processing Management Association
800 835-2246

Viruses, worms and other computer threats are the subject of this conference. Prevention, detection and recovery from viruses are discussed as well as virus experiments and recent outbreaks. Product demonstrations are also featured. Registration fees: $275 for one day; $375 for both days.

Challenging the IS Tradition

Westin Resort, Hilton Head Island, S.C.
March 14-16
The Society for Information Management
312-644-6610

The annual SIM Institutional Member conference features leading business and IS executives in presentations and roundtable sessions that address the measurability of information systems and the question of whether it is better to "retread" or replace IS personnel to meet changing requirements. Registration fees: $875 for institutional members; $2,875 for corporate non-members; $2,075 for academic non-members.

Implementing the Information-Based Organization

Marriott Las Palmas, Rancho Mirage, Calif.
March 15 & 16
Arthur D. Little Inc.
617 639-0208

Peter Drucker is the keynote speaker at this conference which focuses on the business organization of the 1990s and the role of the CEO in information-based companies. Participants disuss how progressive companies are eliminating management layers, improving communications, and speeding up internal processes. Registration fee: $1,195.

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Find out this March as SIM begins **Challenging the IS Tradition**

The Society for Information Management
1990 Institutional Member Conference
March 14-16
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Forecasters and futurists have long articulated a vision of tomorrow's business environment. While they present many views of what this future will look like, we can be certain it will be different and changing at an accelerated pace. Executives can help to shape the future by what they know and do today.

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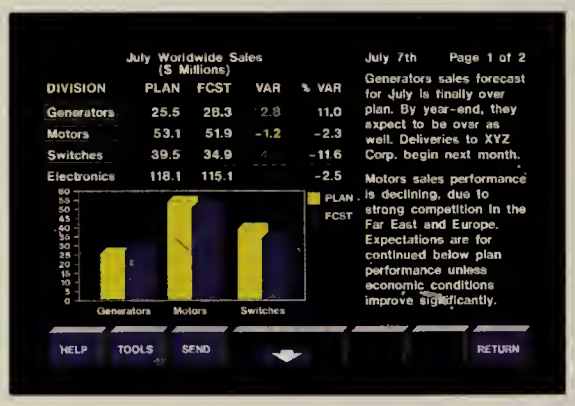

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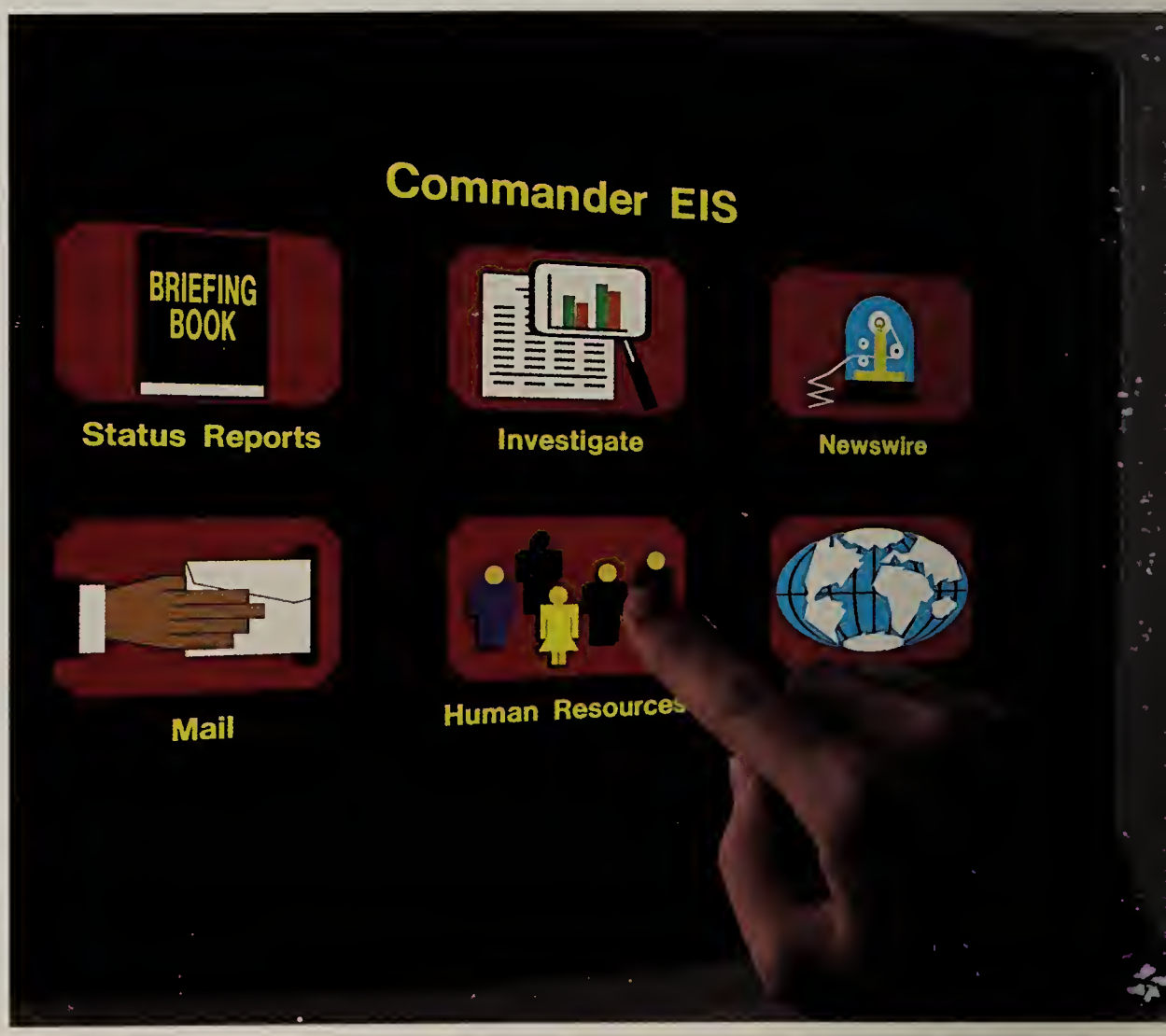

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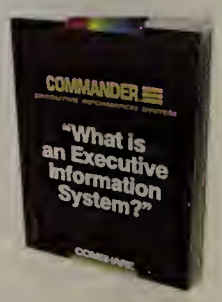

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